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6000 So. Boyle Ave., Box 127, Vernon Station, Los Angeles, Calif.
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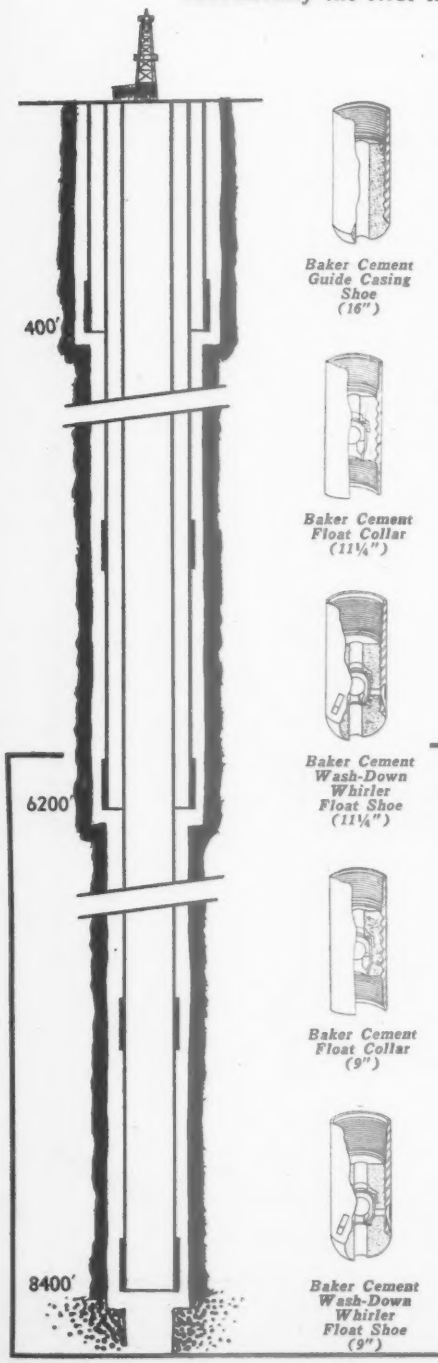
One of the most important steps in oil well drilling is the safe landing and efficient cementing of the casing. Today, with a premium on time, money and materials, it is essential that this vital operation be carried out with every possible provision being made for doing the job safely and successfully *the first time.*



Baker Cement Guide Casing Shoe (16")

Baker Cement Float Collar (11¼")

Baker Cement Wash-Down Whirler Float Shoe (11¼")

Baker Cement Float Collar (9")

Baker Cement Wash-Down Whirler Float Shoe (9")

Consider for example the cost factor alone. The total investment in a well, such as illustrated at left, which was drilled in a California field, approximated $100,500.00—the security of this investment being directly dependent upon the safety and efficiency with which the casing (the foundation of the well), was landed and cemented.

The cost of the Baker Cement Guiding, Floating, Cementing Equipment used to safely and efficiently do this particular job (also illustrated) was not 10% or even 5%, but approximately *FOUR TENTHS OF ONE PERCENT* of the total well cost.

This figure certainly is insignificant in relation to the total well investment. That's why we say it costs so little to use the best — and Baker Equipment is the best that money can buy — the best that experience and engineering skill can produce. *Baker makes no compromise with quality* and hence no compromise with successful results.

When planning your casing program, don't overlook this cost factor — it will pay you dividends.

GET THE FACTS!

If you are not fully acquainted with Baker Wash-Down Whirler Equipment and the remarkable results operators are securing with it — *get the facts today.*

See pages 227-236 of the 1942 Baker or Composite Catalog, or contact the nearest Baker office or field representative.

Operators WHO WANT TO BE "SURE"

USE THE . . .

*BAKER CEMENT WASH-DOWN WHIRLER FLOAT SHOE

and HERE'S WHY . . .

It will safely guide and float the longest and heaviest string of casing.

It has a positive-acting BALL-TYPE Back-Pressure Valve.

It provides WHIRLING ACTION which assures best possible cement distribution at the shoe joint with minimum hazard of channeling.

It affords easy drillability.

*Product No. 120

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production By States — Page 94

CRUDE PRODUCTION 4,099,695 bbl. daily average—up 103,250 bbl. One year ago 3,673,570.

CRUDE STOCKS 240,927,000 bbl. as of July 3—down 1,730,000 bbl. One year ago 253,280,000 bbl.

GASOLINE STOCKS 78,316,000 bbl. as of July 3—down 1,273,000 bbl. One year ago 86,660,000 bbl.

RESIDUAL FUEL-OIL STOCKS 66,470,000 bbl. as of July 3—down 1,490,000. One year ago 77,401,000 bbl.

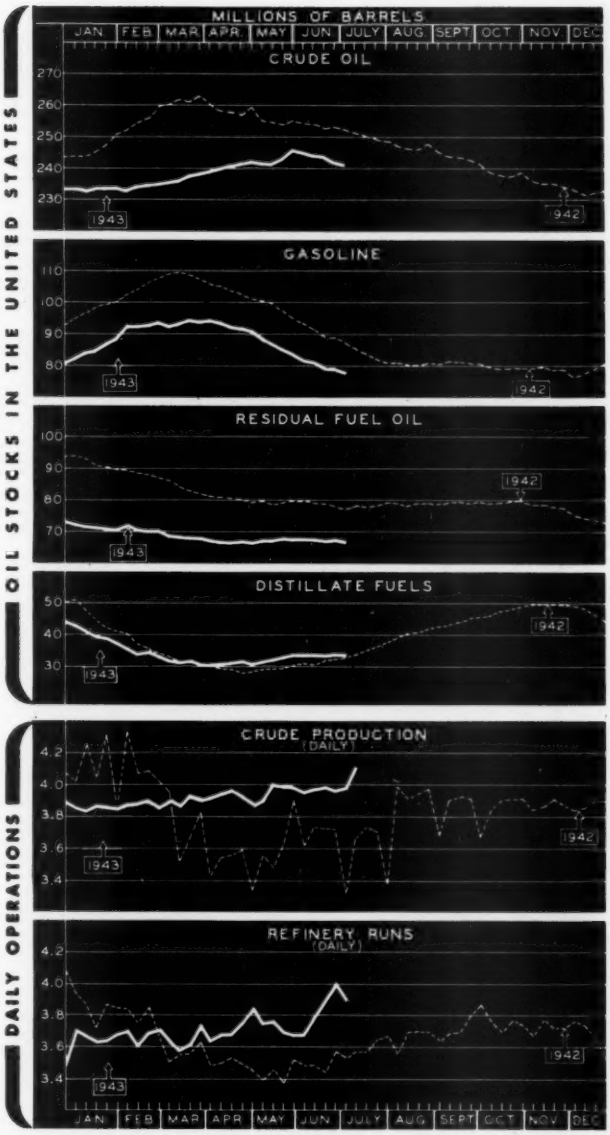
GAS OIL AND DISTILLATES 34,380,000 bbl. as of July 3—up 336,000. One year ago 33,022,000 bbl.

REFINERY RUNS 3,905,000 bbl. daily week ended July 3—down 110,000. One year ago 3,552,000 bbl.

WITH domestic crude-oil production last week at the highest level since March 1942 and crude runs to stills increasing so that they are now within 100,000 bbl. daily of the Pearl Harbor period, the petroleum industry is finding out what it can do in peak domestic operations. Crude-oil output last week for the country as a unit was in line with the PAW recommendations for July with no important discrepancies—below or above the recommendation—in any of the large oil areas. It was apparent, however, that this crude-oil supply was not keeping pace with the recent substantial expansion in refinery operations, which for the week ending July 3 were 243,000 bbl. daily greater than for the corresponding week in June and late May. During this period of 28 days, according to government reports, stocks of crude oil decreased 4,180,000 bbl., or an average of 150,000 bbl. daily. Most of the expansion in refinery operations has been in the censored area with most of the decline in crude-oil stocks in Texas.

WITH the expansion in over-all refinery operations there is considerable complaint regarding the distribution of crude oil supplies under the PAW allocation program. It is claimed that while some refiners are able to obtain all the crude oil that they are entitled to under the allocation, there are other plants whose operations are curtailed because crude oil is not being delivered to them as scheduled. This is particularly true in the case of District 2 (upper Mid-Continent and Middle West) where experience has demonstrated that more crude oil was allocated than available in that area. Some plants have been drawing on storage while others have curtailed operations.

THIS situation is being given special consideration in Washington and in the district PAW offices. It is felt that some relief will be forthcoming next month when the eastern leg of the 24-in. line is available. This will end the rail movement from Norris City, Ill., the present terminus of the 24-in. and tank cars now in eastern service from that point will be available for use elsewhere. While it has been understood that these tank cars would be needed to move products from southwestern and Middle West refineries to eastern bulk stations and terminals, those in a position to know state that some of the cars will have to be used in crude-oil shipments from District 3 fields to District 2 refineries. An announcement regarding August refining and transportation plans is expected in a few days.



Refinery Runs of 4,100,000 Barrels Daily Indicated to Meet Manufacturing Schedule

by Henry D. Ralph

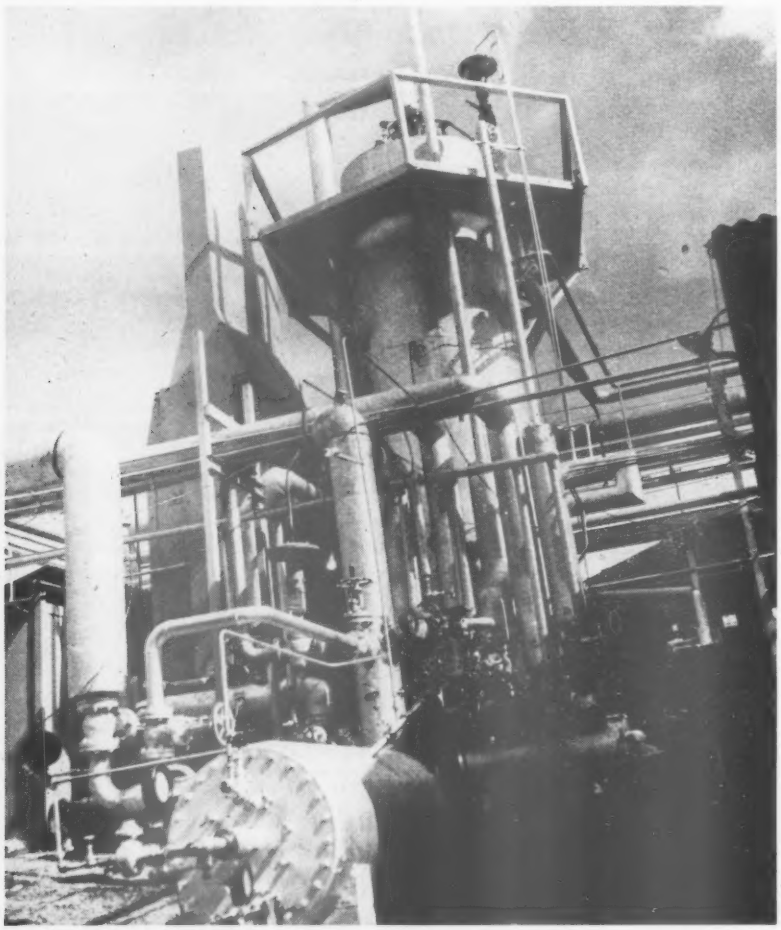
WASHINGTON, D. C.—July quotas for crude-oil runs of refineries east of the Rockies have been revealed belatedly by the Petroleum Administration for War.

Runs to stills this month will average nearly 4,100,000 bbl. daily, based on the quotas specifically assigned for Districts 1, 2 and 3, which total 3,195,000 bbl. Only Gulf Coast plants are included in the District 3 quotas, leaving plants in Inland Texas, New Mexico and North Louisiana unaccounted in the allocations. The approximate figure of 4,100,000 bbl. includes the current charges to stills of 812,000 bbl. in Districts 4 and 5 where no specific quotas have been established.

For District 1 the July total is 660,000 bbl. daily, which is an increase of 10,000 bbl. over the June total. Of this, about 106,000 bbl. will be assigned to refineries in the Appalachian area. The increase, which will go to war-products plants, was made in spite of the fact that crude oil must be diverted from East Coast refineries to fill the leg of the big-inch line in the latter part of July.

In District 2 the total for July is 1,125,000 bbl. daily, a decrease of 40,000 bbl. below June. The decrease was attributed to the inability of these refineries to obtain sufficient crude to attain their June quotas. Because of the seasonal need for additional gasoline for agricultural uses, District 2 refiners were temporarily relieved of all restrictions on quantities of motor fuel produced. Previously they were limited to 90 per cent of yields compared with normal operations.

District 3 refinery run quotas for July total 1,410,000 bbl., an increase of 63,000 bbl. over June, the increase to be used to balance stocks and build up inventories of heating oil, residual fuel, and war products.



This semicommercial adiabatic cracking unit at a Sun Oil Co. refinery is the first plant of its kind in the world. It is designed for production of superaviation fuel

DISTRICT 1 QUOTAS

Company and location—	Bbl./day
Mexican Pet. Corp., Savannah, Ga.	2,900
Continental Oil Co., Baltimore, Md.	7,000
Pan American Ref. Corp., Baltimore, Md.	2,600
Colonial Beacon Oil Co., Everett, Mass.	26,297
Tide Water Associated Oil Co., Bayonne, N. J.	54,000
Atlantic Ref. Co., Philadelphia, Pa.	80,000
Sinclair Ref. Co., Marcus Hook, Pa.	44,000
Sun Oil Co., Marcus Hook, Pa.	86,000
Gulf Oil Corp., Philadelphia, Pa.	41,000
Gulf Oil Corp., Staten Island, N. Y.	3,604
American Bitumals Co., Baltimore, Md.	2,400
American Bitumals Co., Providence, R. I.	1,400
Standard Oil Co. of New Jersey, Bayonne, N. J.	104,823
Standard Oil Co. of New Jersey, Baltimore, Md.	22,400
Standard Oil Co. of New Jersey, Charleston, S. C.	2,840
Cities Service Oil Co., Linden, N. J.	13,000
Cities Service Oil Co., E. Braintree, Mass.	13,120
Cities Service Oil Co., Petty's Island, Pa.	4,826
Socony-Vacuum Oil Co., E. Providence, R. I.	3,500
Socony-Vacuum Oil Co., Paulsboro, N. J.	18,500
Socony-Vacuum Oil Co., Brooklyn, N. Y.	19,790

DISTRICT 2 QUOTAS

Advance Ref. Co., Centralia, Ill.	2,000
Aetna Oil Co., Louisville, Ky.	5,680
Allied Materials Corp., Stroud, Okla.	675
Allied Oil Corp., St. Elmo, Ill.	2,960
Anco Ref. Co., Inc., Garnet, Kans.	200
Anderson-Prichard Ref. Corp., Cyril, Okla.	7,830
Arrow Pet. Co., Forest Park, Ill.	1,560
Ashland Oil & Ref. Co., Ashland, Ky.	16,000
Aurora Gasolina Co., Detroit, Mich.	5,000
Aurora Gasoline Co., Elsie, Mich.	2,320
Bareco Oil Co., Barnsdall, Okla.	3,360
Bareco Oil Co., Wichita, Kans.	3,680
Bay Pet. Corp., McPherson, Kans.	4,300
Bay Ref. Co., Bay City, Mich.	3,480
Bell Oil & Gas Co., Grandfield, Okla.	2,800

Company and location—	Bbl./day
Bell Oil & Gas Co., Ardmore, Okla.	3,500
Canton Ref. Co., Canton, Ohio	7,000
Casada Ref. Co., Salem, Ill.	1,600
Champlin Ref. Co., Enid, Okla.	10,800
Chanute Ref. Co., Chanute, Kans.	640
Cities Service Oil Co. (Del.), East Chicago, Ind.	30,000
Cities Service Oil Co. (Del.), Ponca City, Okla.	10,500
Consumers Coop. Asso., Scottsbluff, Neb.	1,300
Consumers Coop. Asso., Phillipsburg, Kans.	3,400
Continental Oil Co., Ponca City, Okla.	23,629
Cosco Oil Co., Wynnewood, Okla.	2,400
Cross Co., Henry H., Dupo, Ill.	600
Cross Co., Henry C., Colman	240
Crystal Ref. Co., Carson City, Mich	2,800
Cushing Ref. & Gasoline Co., Cushing, Okla.	3,104
Deep Rock Oil Corp., Cushing, Okla.	9,200
Delta Ref. Co., Memphis, Tenn.	3,627
Derby Oil Co., Wichita, Kans.	6,500
El Dorado Ref. Co., Eldorado, Kans.	6,000
Fortdale Oil & Ref. Co., Bloomingdale, Mich.	1,120
Globe Oil & Ref. Co., McPherson, Kans.	12,720
Globe Oil & Ref. Co., Lamont, Ill.	21,600
Gulf Ref. Co., Cleves, Ohio	21,400
Gulf Ref. Co., Toledo, Ohio	17,200
Indiana Farm Bureau Coop., Mount Vernon, Ind.	2,360
Johnson Oil Ref. Co., Cleveland, Okla.	4,160
Johnson Oil Supply, Gary, Ind.	1,360
Kanotex Ref. Co., Arkansas City, Kans.	7,500
Lakeside Ref. Co., Kalamazoo, Mich.	960
Leonard Refineries, Inc., Alma, Mich.	2,240
Leonard Refineries, Inc., St. Louis, Mich.	4,000
Louisville Ref. Co., Louisville, Ky.	4,400
Marvel Refineries, Inc., Grand Rapids, Mich.	1,280
Mercury Oil Ref. Co., Oklahoma City, Okla.	1,500
M.F.A. Oil Co., Chanute, Kans.	*1,305
Mid-Continental Pet. Corp., West Tulsa, Okla.	30,000
Mid-States Ref. Co., Falls City, Neb.	950
Mid-West Refineries, Inc., Alma, Mich.	3,000
Mid-West Refineries, Inc., Grandville, Okla.	4,500
Monarch Refineries, Inc., Oklahoma City, Okla.	120
Naph-Sol Ref. Co., Muskegon, Mich.	2,800
National Ref. Co., Coffeyville, Kans.	9,400
National Ref. Co., Findlay, Ohio	9,300
Nebraska Prod. & Ref. Co., Salem, Neb.	750
Northwestern Ref. Co., St. Paul Park, Mich.	1,120
Ohio Oil Co., Robinson, Ill.	14,452
Old Dutch Ref. Co., Muskegon, Mich.	2,000
Osceola Ref. Co., Reed City, Mich.	1,080
Pana Ref. Co., Pana, Ill.	2,560
Peerless Ref. Co., Saginaw, Mich.	200
Peppers Gasoline Co., Oklahoma City, Okla.	720
Petroleum Products Co., Chanute, Kans.	1,160
Petroleum Specialties, Inc., Flat Rock, Mich.	1,080
Petroleum Utilities Co., Inc., Chadron, Neb.	160
Phillips Pet. Co., Okmulgee, Okla.	5,160
Phillips Pet. Co., Kansas City, Kans.	23,316
Producers Ref., Inc., West Branch, Mich.	2,000
Pure Oil Co., Midland, Mich.	3,280
Pure Oil Co., Toledo, Ohio	27,400
Pure Oil Co., Heath, Ohio	14,680
Rock Island Ref. Co., Indianapolis, Ind.	3,640
Rock Island Ref. Co., Duncan, Okla.	6,400
Roosevelt Oil Co., Mount Pleasant, Mich.	4,500
Searle Pet. Co., Omaha, Neb.	650
Shallow Water Ref. Co., Garden City, Kans.	2,400
Shell Oil Co., Wood River, Ill.	76,000
Sinclair Ref. Co., Sand Springs, Okla.	3,600
Sinclair Ref. Co., East Chicago, Ind.	51,000

*Figure for June, missing from July allocations.

This Standard Oil Co. (Indiana) unit is now on stream, requiring more charging stock

Company and location—	Bbl./day
Sinclair Ref. Co., Coffeyville, Kans.	10,450
Sinclair Ref. Co., Kansas City, Kans.	12,000
Skelly Oil Co., El Dorado, Kans.	22,500
Socony-Vacuum Oil Co., Augusta, Kans.	23,816
Socony-Vacuum Oil Co., East Chicago, Ind.	20,143
Socony-Vacuum Oil Co., Trenton, Mich.	22,542
Socony-Vacuum Oil Co., East St. Louis, Ill.	12,816
South Kentucky Pipe Line Co., Somerset, Ky.	150
Southern Oil Service, Nashville, Tenn.	240
Standard Oil Co. (Indiana), Sugar Creek, Mo.	22,400
Standard Oil Co. (Indiana), Wood River, Ill.	21,600
Standard Oil Co. (Indiana), Whiting, Ind.	120,846
Standard Oil Co. (Indiana), Neodesha, Kans.	6,400
Standard Oil Co. (Ohio), Latonia, Ky.	13,300
Standard Oil Co. (Ohio), Lima, Ohio	10,000
Standard Oil Co. (Ohio), Toledo, Ohio	18,000
Standard Oil Co. (Ohio), Cleveland, Ohio	29,000
Stoll Oil Ref. Co., Louisville, Ky.	1,600
Sturgis Ref. Co., Sturgis, S. D.	80
Sun Oil Co., Toledo, Ohio	30,000
Sunray Oil Co., Allen, Okla.	5,000
Texas Co., Lawrenceville, Ill.	27,485
Texas Co., Lockport, Ill.	43,219
Texas Co., Tulsa, Okla.	15,200
Texas Co., Pryse, Ky.	1,200
Tide Water Associated Oil Co., Drumright, Okla.	8,000
Transport Oil & Ref. Co., Dupo, Ill.	160
Troy Ref. Corp., Troy, Ind.	280
Vickers Pet. Co., Inc., Potwin, Kans.	4,300
Wilcox, H. F., Oil & Gas Co., Bristow, Okla.	2,480
Wisconsin Oil Ref. Co., Inc., Sheboygan, Wis.	2,080
Wood River Oil & Ref. Co., Hartford, Ill.	10,560
Worth Ref. Co., Blue Island, Ill.	3,040

DISTRICT 3 QUOTAS

Gulf Coast Nonwar Plants

Chalmette Pet. Corp., Chalmette, La.	7,715
Eastern States Pet. Co., Inc., Houston Tex.	8,575
Sinclair Ref. Co., Corpus Christi, Tex.	8,267
Southport Pet. Co., Texas City, Tex.	14,541

Gulf Coast War Plants

Amsco Ref. Co., Corpus Christi, Tex.	8,100
Atlantic Ref. Co., Atreco, Tex.	23,609
Coastal Refineries, Inc., Port Isabel, Tex.	6,300
Continental Oil Co., Lake Charles, La.	10,605
Crown Central Pet. Corp., Houston, Tex.	12,922
Gulf Oil Corp., Port Arthur, Tex.	137,054
Humble Oil & Ref. Co., Baytown, Tex.	163,662
Humble Oil & Ref. Co., Ingleside, Tex.	32,400
Magnolia Pet. Co., Beaumont, Tex.	99,218
Maritime Oil Co., Houston, Tex.	5,630
Pan American Ref. Co., Texas City, Tex.	95,100
Pan American Ref. Co., Destrehan, La.	8,500
Pontiac Ref. Corp., Corpus Christi, Tex.	19,035
Pure Oil Co., Nederland, Tex.	44,055
Republic Oil Ref. Co., Texas City, Tex.	18,100
Sinclair Ref. Co., Houston, Tex.	65,697
Southwestern Oil & Ref. Co., Corpus Christi, Tex.	12,049
Standard Oil Co. of Louisiana, Baton Rouge, La.	134,741
Taylor Ref. Co., Corpus Christi, Tex.	14,410
Texas Co., Port Neches and Port Arthur and Galena Park	166,302
Shell Oil Co., Inc., Houston and Norco	93,463

Expansion Planned for All Phases of Mexican Petroleum Operations

THE Mexican petroleum industry, convinced that current reduction in exports is only temporary, is proceeding with a program of expanding its exploration operations, improving refining facilities and extending distribution facilities. This is the nucleus around which is written a review of Mexican petroleum operations in the current issue of Foreign Commerce Weekly, a publication of the U. S. Department of Commerce.

The program of Petroleos Mexicanos, official organization of the Mexican Government, calls for 54 new drilling operations in 1943. Exploration work is projected in new regions such as that west of Faja de Oro, Chicontepec and south of Poza Rica to the eastern Sierra Madre and in Tabasco; also along the Pacific Coast of Lower California, Sonora, and Sinaloa and in the northeastern part of the country in Nuevo Leon and Tamaulipas.

Production Moving Upward

During the first 4 months of 1943, Mexican production has been at the rate of 82,279 bbl. daily Output aggregated 32,955,000 bbl. in 1942, an average of slightly more than 90,000 bbl. daily, although this total was approximately 20 per cent lower than the yield of 41,160,000 bbl. recorded in 1941.

Mexico's present oil reserves are estimated at 750,000,000 bbl. The properties, states a report by Efrain Buenrostro, general manager of Pemex, have been administered with the objectives of conserving known petroleum reserves and of exploiting them according to established techniques of the industry. Exploring for new oil strata to replace current extraction and to augment future potential production is also prominent among the administrative agenda.

Difficulties in obtaining equipment have persisted since 1938. These have been eased in the past 2 years by action of the United States in conceding priorities that have permitted Petroleos Mexicanos to secure important amounts of equipment necessary for operation and maintenance. Pemex reported the drilling of 91 wells in various parts of the country over the last 5 years. Of this number, 54 were producers.

The condition of processing equipment in the refining branch of the industry has not only been maintained, but new capacity has been added, the official report says. As instances of activity the following improvements are cited:

1. Installation of new cracking towers in various refineries:

2. Replacement of the obsolete asphalt plant at Ciudad Madero by a modern unit.

3. Adaptation of an old gasoline-treating plant at Ciudad Madero to obtain a high-octane product.

4. Installation of two new heaters of 10,000-bbl. capacity each at the Minatitlan refinery, replacing 10 obsolete heaters.

5. Acquisition of three modern boilers at the same refinery to replace facilities in operation over 30 years.

6. New construction at Bella Vista to increase refining capacity, based on plans prepared exclusively by Pemex technicians.

7. Planning and construction by Mexican technicians of a plant to produce tetraethyl fluid.

Present refining capacity is stated to be 150,000 bbl. a day, compared with 120,000 bbl. refined daily in 1938.

It is planned to place the Mexican petroleum industry on a par with that in the most advanced oil-producing and refining nations of the world.

The Mexican program:
1. Fifty-four wells, including several exploratory operations.
2. New cracking facilities and general replacement of obsolete facilities.
3. Expansion of pipe-line capacity by 15,000 bbl., from Poza Rica to Azcapotzalco.

The program calls for modernization and concentration of refineries to a point where they can cope with both internal and foreign demands. Also, it is proposed to acquire equipment to recover valuable byproducts, unobtainable with present equipment.

Progress in the distribution field is also described in the report. Pipe-line facilities have been increased by 135,000 bbl. daily. The capacity of the Poza Rica-Azcapotzalco pipe line has been increased from 15,000 to 22,500 bbl. daily, the Poza Rica-Tuxpan line from 20,000 to 125,000 bbl. daily, and the Poza Rica-Tampico pipe line from 40,000 to 63,000 bbl. daily. It is proposed further to amplify the Poza Rica-Azcapotzalco pipe line to 37,500 bbl. daily.

Tank cars now in use number 1,410, whereas at the time of nationalization there were 771. The company has 530 tank trucks at present; in 1938 a total of 458 were in operation.

Storage capacity has been increased from 1,397,169 bbl. to 1,725,786 bbl., and a general program of centralization has been carried out. The marine plant, construction by the company at Salina Cruz, is said to be of major importance in the distribution of Mexican oil products, for without it shipments to the Pacific Coast would have suffered.

Shipping Facilities Increased

At the time of nationalization, Pemex owned coastwise vessels and lighters for sea transport, and one tank ship was available for navigation on the high seas. Total water transportation tonnage was 17,542. At present, it is pointed out, the concern has in service 93,966 tons of shipping belonging to it or its subsidiary enterprises and, in addition, has 53,256 tons of shipping placed at its disposal by the Mexican Government.

The value of petroleum sales within Mexico has risen from 156,000,000 pesos in 1937 to 254,000,000 pesos in 1942, it is stated. Export sales rose from $8,984,000 in 1938 to $16,000,000 in 1940, but dropped to $7,378,000 in 1942. Since 1941, all foreign sales have been paid for in cash.

Certain aspects of the company's financial situation are touched upon in the new report. Pemex, it is stated, lacked capital for operating on the greatly increased scale that became necessary when management of the industry was assumed by the nation. Government assistance has enabled the company to carry on, and investments to the value of 145,495,814 pesos were made. The government furnished 60,000,000 of this sum, and Pemex supplied the balance out of income obtained from its own operations.

At present, the report discloses, Pemex is up to date in meeting its financial obligations. To meet future commitments, the organization has on hand approximately 38,000,000 pesos.

THIS WEEK

REFINING—New PAW quotas assigned plants in Districts 1, 2 and 3 indicate runs this month will average around 4,100,000 bbl. daily. . . . ¶Quotas in District 2 cut 40,000 bbl., reflecting inability of refiners to arrange adequate crude supplies. . . . Lid removed from percentage of gasoline Middle West operators allowed to make, in July. . . . ¶All aviation-fuel plants on 1943 completion schedule assigned top military preference rating of AA-1. . . . Officials say uprating assures completion on schedule. . . . Plants on next year's schedule still work under AA-2X ratings. . . .

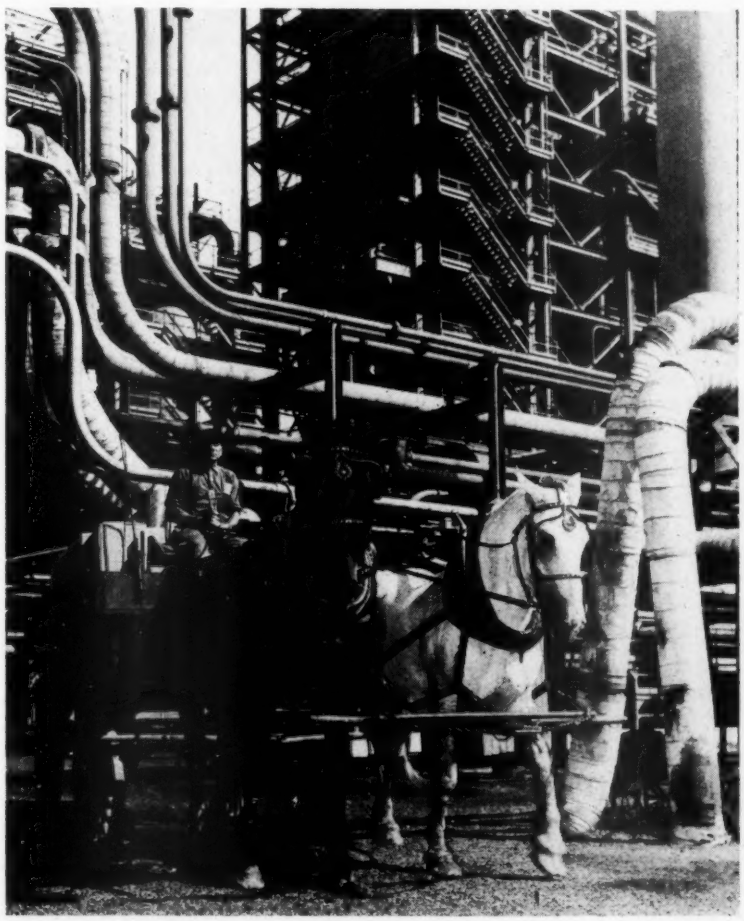
TRANSPORTATION—Ceremony marking WEP big-inch completion set for 2 p.m., July 19, near Phoenixville, Pa. . . . ¶Diversion of 100,000 bbl. daily from Norris City receipts to fill eastern extension to start shortly. . . . Rail shipments will be retarded while line is being filled. . . . ¶Tank-car movement to East Coast falls to 960,362 bbl. daily, off 33,292 from last week's record figure. . . .

SUPPLIES—East Coast index rises to 31.5, marking fourth consecutive increase. . . . Current rate of additions must be maintained until October to attain parity with last year. . . . ¶Impact on petroleum supplies of Sicilian invasion, probably behind the industry. . . . Next shock will come when campaign breaks out in new spot, when it is in planning stage, long before actual execution. . . .

PRODUCTION—Texas launches new survey of available capacity for prompt production, apparently starts drive against avoidable waste of gas. . . . Long Lake and Cayuga fields, both oil and gas wells, shut down by commission order, until low-pressure gas can be utilized. . . . Statements hint at other such actions, possibly warning operators to take corrective steps. . . . ¶Sharp declines of bottom-hole pressure in Magnolia (Arkansas) field causes operators and conservation officials to consider reinjection program. . . . ¶California operators think discovery-bonus plan will stimulate exploration. . . . Necessary restrictions, however, limit advantages for producers. . . . ¶Oklahoma operators and bonus-oil committee seek composition of differences, will attempt to reach compromise July 27. . . .

ADMINISTRATION—Issuance of Redistribution Program 2 precipitates amendments coordinating other petroleum orders with new regulation. . . . Operators must now certify compliance with inventory-control order before new preference ratings are issued. . . . ¶W. W. Vandeveer, president of Allied Oil Co., Cleveland, appointed director in charge of District 2. . . . ¶Wirt Franklin, formerly chief PAW officer in District 2, assigned to special duty of spurring exploration, working directly under Deputy Administrator Davies. . . . ¶C. C. Brown may become District 2 director of production. . . . ¶Congressmen from oil states using recess to press drive for higher crude ceilings. . . . Daily conferences with OPA Chief Brown fail, so far to bring desired results. . . .

NATURAL GAS—Federal Power Commission promises certificate to Tennessee Gas & Transmission Co., if the concern can show financial responsibility, adequate supply of gas. . . . ¶Gov. Sam Jones of Louisiana renews fight against Tennessee company's project, claiming it would drain gas needed for his state's industrial development. . . .



Back on the job again. After nearly 25 years of using only motor trucks for delivery of tools and materials within its Bayway refinery the Standard Oil Co. of New Jersey has returned to the use of horses. Prince and Bill, shown here, were the first to go on the job. Others may follow if they perform satisfactorily. The purpose of course is to conserve gasoline. In the background is the new fluid catalytic cracker, which turns out thousands of barrels of high-octane gasoline for bombers and fighting planes but none for use in the plant

Oil Suppliers Instructed to Give Agriculture Preferred Treatment

WASHINGTON, D. C.—The Petroleum Administration for War has directed suppliers in all parts of the country to give nonhighway farm requirements for gasoline the same preferred procurement status as military forces. This has been the practice in District 1 since the recent critical gasoline shortage.

Farm motor-fuel requirements for the entire country are estimated at 100,000 bbl. per day at present, with 70,000 of this in the Midwest. R. K. Davies, deputy administrator, said that because of declining production in the Midwest and increased military requirements and movement of gasoline out of District 2 this action is necessary to maintain farming activities and no other steps can be taken short of further restriction on use of gasoline for less essential civilian motoring.

The fact that District 2 refineries ran only about 1,100,000 bbl. of crude daily in June compared with a quota of 1,165,000 has added to the tight gasoline situation, Mr. Davies said, but he anticipates the July quota of 1,125,000 which is 168,000 bbl. more than expected crude production in District 2, can be met by exchanges of crude and further drafts on crude stocks.

Digest of Manpower Rules Issued by PIWC Committee

WASHINGTON, D. C.—A digest of manpower rules and regulations, with particular emphasis upon those dealing with petroleum, has been issued by the Petroleum Industry War Council's committee on manpower.

The 32-page booklet outlines briefly the laws and executive orders relating to manpower, and the current interpretations of the rules and regulations issued by the Selective Service, War Manpower Commission, and other government agencies under these laws and orders.

Subjects covered include the Selective Service procedure relating to occupational deferments, the replacement schedule and manning-table plans, wage and salary stabilization rules, the minimum 48-hour week, hiring controls, restrictions on transfer of workers, appeal procedures, and the manpower activities of the Petroleum Administration for War. The replacement schedule plan, which is called "the most effective means of dealing with Selective Service withdrawals," is described in detail.

In a preface the committee, of which John M. Lovejoy, New York, president of Seaboard Oil Co., of Delaware, is chairman, warns that the booklet is not a legal guide, but has been designed to inform oil industry employers and employes of the orders and regulations affecting manpower problems in the industry, and to suggest procedure to be followed in meeting such problems.

Copies of the booklet may be obtained from the council at 1625 K Street NW, Washington 6, D. C., for 10 cents each. Quantity prices will be quoted on request.

Viscosity Classifications

In this issue starting on page 49, The Oil and Gas Journal makes available to manufacturers and users of lubricating oils the most complete discussion of viscosimetry and new graphical viscosity classifications ever published. Illustrated with three-color charts the following data are provided:

1. Viscosity index—A.S.T.M. (D567-41) and corresponding values at 130° F.

2. Kinematic and Saybolt Universal viscosities—Conversion scales based on and amplified from A.S.T.M. standard method for conversion of kinematic viscosity to Saybolt Universal viscosity (D446-39).

3. S.A.E. numbers—Viscosity crankcase oil classification.

4. Automotive manufacturers' viscosity classification.

5. S.A.E. numbers—Viscosity transmission and axle lubricant classification.

6. Viscosity-temperature relationships at 0° F., 100° F., and 210° F. for crankcase oils and gear lubricants.

7. A new viscosity blending and dilution chart.

This treatise was prepared by C. M. Larson and W. C. Schwaderer of Sinclair Refining Co.

Premiums Sustained in Crude-Oil Contracts

WASHINGTON, D. C. — Preservation of margins existing between purchasers and producers of crude oil, when specific maximum prices are set for an individual area was held obligatory in a ruling issued by the Office of Price Administration July 7.

Those with contracts in existence on October 1, 1942, or renewed thereafter, or with new contracts between the same buyer and seller concerning the same production, have the right to require payment of the same differentials, according to Amendment 114 to Revised Price Schedule 88, effective July 14, 1943.

This amendment provides that the maximum price to one holding such a contract is the sum of the contract price and the difference between the specific price set and the lowest posted price as of October 1, 1941.

For example, the ceiling for crude petroleum at the receiving tank in one particular area may have been 93 cents per barrel, this being the lowest posted price on October 1, 1941. Because of special circumstances existing in this area, say, OPA grants an increase in the ceiling to 98 cents per barrel. Certain buyers had contracts calling for 7 cents a barrel above the 93-cent level. These buyers then have to pay 5 cents above the contract price of $1, or $1.05. Thus in the illustration the differential previously prevailing is maintained.

Duly authenticated copies of contracts must be filed with the Petroleum Branch of the Office of Price Administration in Washington, D. C., within 30 days after the effective date of today's amendment unless copies of the contracts previously were filed with OPA.

The OPA amendment makes clear what was intended to be the practice in cases where specific ceiling prices are established in places of posted prices. These individual area increases have been made in a number of instances where special conditions have made them desirable.

R. R. McLachlen Appointed PAW Materials Assistant

WASHINGTON, D. C.—Robert R. McLachlen has been appointed assistant director of the Materials Division, Petroleum Administration for War, succeeding Howard C. Turner who is now on the PAW organization-planning staff. Mr. McLachlen had varied experience in the oil industry and was vice president of Diversified Royalties, Inc., Los Angeles, until January 1942, when he joined WPB as materials liaison representative with PAW.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Give Initiative a Chance

THERE are those in Washington who are quickly and calmly becoming reconciled to the implications of statements that our domestic crude-oil production will never again catch up with requirements, with the additional observation that if it were not for war controls this country would now in fact be an importer rather than an exporter of petroleum and its products.

This attitude reflects a feeling that nothing can be done about it along with the belief that there is plenty of outside oil which can be brought here—so why worry?

If consumers were aware of the full meaning of this assumption they would jolt those responsible for the short-sighted governmental policies which account for present shortages and action would take the place of complacency

A continuance of the trend toward decreased domestic supplies will mean many things to this country's postwar economy aside from its immediate military significance. For civilians it assures permanent rationing in use and much higher prices, thus demonstrating again that control of demand and ascending costs inevitably follow arbitrary restrictions in producing operations.

Domestic scarcity will end this nation's source of greatest strength in peace and war as demonstrated by developments of the past few years and force it to enter directly into the oncoming international struggle for oil with its entangling alliances in trade and politics.

There are important sources of foreign oil and those outside this country in the Western Hemisphere are to be drawn upon in increasing quantities to supply the expanding offensives.

But when the war is over this foreign oil and much more will be needed in the rehabilitation of the invaded and fighting countries of the Eastern Hemisphere. It is reasonable to assume that the oil demands of other nations where the per capita consumption is a small fraction of our own, will expand quickly furnishing a growing market for any supplies available within their own boundaries and in nearby areas.

Before this country becomes a part of the scramble for this most essential commodity, government leaders should have the foresight to give its own operators an opportunity to put to work new and old practices on a full-scale basis.

Consumers now have the protection that came with developments in the manufacturing arts which can if necessary draw on practically limitless coal and shale-oil resources to supplement the hydrocarbon supplies of petroleum. These arts, if a normal commercial development is permitted, are of themselves a guarantee of continued reasonable prices for domestic users.

With restrictions in materials, the highest taxes, and price levels of the late 1930s, not as much new oil has been found as was consumed. The same limitations have applied to manufacturing operations except for the refining of war products. Pipe lines have been restricted with senseless controls.

Unleash the producers, refiners, and transporters and let them demonstate over a period of 3 to 5 years what they can do. With their new technology they never were stronger in everything that is required to balance supplies and demands and they have never failed in the past. In brief, give competitive enterprise and oil initiative, as it was developed in this 84-year-old industry, another opportunity before becoming reconciled to the half loaf.

Increase in Refinery Runs Dictated by Low Level of Burning-Oil Inventories

WASHINGTON, D. C.—Substantial increases in refinery operations will be necessary in the immediate future "if a substantial seasonal accumulation of fuel-oil stocks is to be attained in the third quarter."

This apparent necessity of increasing manufacturing operations was cited last week in the Bureau of Mines monthly petroleum forecast for July, which projected crude runs to stills this month at a rate of 3,829,000 bbl. daily. Runs to stills during the first 2 weeks of July averaged nearly 4,000,000 bbl. daily, according to A.P.I. reports, indicating that manufacturing operations will be maintained at a level substantially higher than forecast by the Bureau of Mines.

Crude Demand to Rise

A further sharp rise in crude demand is expected by the bureau in the third quarter. The demand for crude during the second quarter of 1943 may approximate 3,980,000 bbl., the report points out, which is about 1.5 per cent above the bureau forecast.

"Total demands for gasoline and residual fuel oil," declares the bureau, "appear to have been unexpectedly high in the second quarter, with an abnormal seasonal reduction in gasoline stocks and with no substantial increase in residual stocks. While the war demands for gasoline have expanded rapidly, civilian consumption seems to be much greater than was anticipated. A continuation of the high rate of gasoline demand implies either a substantial gain in the yield from crude or further increases in crude runs rather than too heavy withdrawals from gasoline stocks."

Since this forecast of July operations was prepared, invasion of Europe has been launched, probably accompanied by another sharp increase in military consumption. The bureau points out that civilian requirements have been exceeding expectations and warns that fuel-oil inventories should rise.

Total demand for motor fuel in July is estimated at 54,300,000 bbl., 6 per cent less than the actual for the same month a year ago, when sales were abnormally high previous to the inauguration of rationing in the eastern states.

Stocks of gasoline at the end of May, the bureau's report shows, were approximately 82,650,000 bbl., equivalent to 48.5 days' supply compared with 53.3 days' supply represented by the 94,681,000 bbl., on hand May 31, 1942. The bureau estimates a reduction in finished stocks of 2,500,000 bbl. for July, compared with 8,423,000 bbl. actual decrease in July 1942.

The estimated demand for domestic crude oil in July is 125,200,000 bbl., or 4,038,000 bbl. daily, 6 per cent higher than the actual requirement in July 1942. Exports, losses and crude used as fuel will aggregate 6,800,000 bbl. this month, the bureau estimates.

Benzol and direct sales of natural gasoline are estimated as 1,700,000 bbl., making an indicated refinery production of 50,100,000 bbl., distributed among the various refining districts as follows (thousands of barrels): East Coast, inland Texas, Texas Gulf Coast, Louisiana Gulf Coast, and inland Louisiana Gulf Coast, and inland Louisiana-Arkansas, 23,090; Appalachian, 2,000; Indiana, Illinois, Kentucky, etc., 10,790; Oklahoma, 2,350; Kansas, 2,840; Rocky Mountain, 1,330; and California, 7,700.

Athabaska Tar-Sand Plant Scheduled for Expansion

CHATHAM, Ont. — Tar-sand holdings of International Bitumen Co. and R. C. Fitzsimmons at Bitumont on the Athabaska River 50 miles below McMurray have been taken over by Oil Sands, Ltd., sponsored by Montreal interests. The transfer includes 3,800 acres of tar-sand deposits, the separation and processing plant and the patent process of tar-sand treatment developed by Mr. Fitzsimmons.

The new company, in which the International Bitumen Co. retains an interest will enlarge the existing plant, which at present is of 322-bbl. capacity, and resume production as soon as additional equipment is installed.

SUMMARY OF FORECASTS FOR JULY 1943—(BARRELS)

	Forecast July 1943	Forecast June 1943	Actual July 1942
Demand for motor fuel*	54,300,000	51,100,000	57,654,000
Supply of motor fuel:			
Straightrun and cracked	45,110,000	41,510,000	43,034,000
Natural gasoline used at refineries	4,990,000	4,590,000	4,577,000
Total refinery production	50,100,000	46,100,000	47,611,000
Other natural gasoline and imports	1,700,000	1,700,000	1,620,000
Decrease in finished stocks	2,500,000	3,300,000	8,423,000
Available supply	54,300,000	51,100,000	57,654,000
Crude-oil requirements:			
Per cent yield of gasoline from crude	38.00	37.00	38.58
Refinery crude required	118,700,000	112,200,000	111,555,000
Daily average	3,829,000	3,740,000	3,598,500
Domestic crude runs	118,400,000	112,000,000	111,153,000
Exports, fuel and losses	6,800,000	6,800,000	6,694,000
Total demand for domestic crude	125,200,000	118,800,000	117,847,000
Daily average	4,038,700	3,960,000	3,801,500
Decrease in domestic stocks			6,065,000
Actual production			111,782,000
Daily average			3,605,000

*The term "motor fuel" as used in this report includes gasoline and naphtha used for all purposes, but does not include heavier distillates used in the operation of tractors or burned in diesel engines.

Texas Seeks Index

Commission Will Determine the Immediate Productive Capacity

Ability of Texas to increase current production, in contrast to the ultimate recoverable reserves, has an important bearing on what the industry does over the remaining war months. Drilling, transportation and refining are involved in the answer.

AUSTIN, Tex.—A series of hearings to determine how much more oil could be produced from certain Texas fields without preventable physical waste will be launched July 20 by the Railroad Commission. Also, the commission will determine how long the maximum rates of production could be maintained.

A similar state-wide study was made early this year at which time it was determined that the Texas fields could increase their output 1,339,865 bbl. per day. The report was issued in February, representing December and January data. The allowable at that time was 1,149,130 bbl. daily.

The current PAW production quota of 1,727,000 bbl. daily, including natural gasoline and condensate, is held by some operators to be near the maximum which can be withdrawn without avoidable physical waste.

Evidence will be taken here July 20 on a group of fields including those in Refugio, Calhoun, Victoria and Bee counties. Jackson County fields, including Harmon, Maurbro, West Mauritz, Mayo, Stewart, West Ranch, Ganado, North La Ward and Lolita will be reviewed July 21.

Gas Policies Changing

A more conservative policy in the husbanding of natural-gas resources was displayed last week by the Railroad Commission which ordered the Cayuga and Long Lake fields shut in, effective July 15, pending satisfactory arrangements either to return gas accompanying oil production to the reservoir or negotiate its sale for commercial purposes. Cycling plants which return gas were exempt from the shutdown order along with wells to which they are connected.

Col. E. O. Thompson, member of the commission, sounded the keynote of the more conservative policy. His statement accompanying the Cayuga and Long Lake shutdown order indicated that similar action may be applied later to other fields where production conditions are comparable.

"So much attention has been paid to oil in the past," declared Colonel Thompson, "that many people have perhaps overlooked the more important gas. For example, up in West Virginia where the gas is playing out, contracts are being made currently for the sale of gas at 18 cents per 1,000 cu. ft. at the well. With America at the bottom of the barrel as regards to oil and with new discoveries not being made as fast as we are consuming this vital product, it is well for us to exert every possible effort to prevent any waste of natural gas.

"The natural-gas reserves of America today are 93 trillion cubic feet. It is well established that 6,000 cu. ft. of gas are the equivalent of 1 bbl. of oil. Therefore, 93 trillion cubic feet of gas converted to oil at this rate would equal 18 billion barrels. This closely approximates the total known oil reserves of the nation which are estimated at around 20 billion barrels.

"There is a method known as the Fischer-Tropsch process by which methane, which is a dry gas, can be converted into gasoline at the cost of from 9 to 12 cents per gallon. Gasoline today is being refined from petroleum and selling at the refineries for around 5 cents per gallon. Thus, it can be seen how important it is for us to first discover as much oil as we can, and failing in this to keep our natural gas in reserve as a substitute when the oil has played out, or when the quantities that can be produced without waste or harm to the fields is not great enough to supply our national demand.

"That day is not far distant unless a great impetus is given producers to discover new oil fields. The best incentive is an increase in price of 35 cents a barrel which has been so generally recommended by almost everybody for so long.

"Recently in California a 25-cent increase was allowed to go into effect by the OPA and there was an immediate increase in drilling of 52 per cent. This action in the last 2 months again proves conclusively the history of the oil business, namely: that a price advance always increases drilling and greater drilling always in the past has brought in new discoveries."

Pressure Decline in Magnolia Field Causes Study of Water Withdrawals

EL DORADO, Ark.—The physical condition of the Magnolia oil field in Columbia County, where the salt-water problem is causing concern both among operators and members of the Arkansas Oil and Gas Commission, will be studied at a statewide hearing in El Dorado, July 21.

Announcement that the salt-water problem would be brought to the attention of the commission was made by Alec M. Crowell, director of conservation and production for that body.

It is expected that recommendations will be made by operators at the hearing. The third meeting of a committee of technical men representing Magnolia operators was held in Shreveport, La., last week when initial steps were taken toward selection of a salt-water-disposal well in the field. It was announced here that the committee decided to recommend that operators select one well to determine if it is economically feasible to reinject salt water into the producing formation, which is the Smackover lime.

The Magnolia field currently is producing about 20,000 bbl. of oil and 15,000,000 cu. ft. of gas daily under the commission allowables. The field is reported as producing an increasing amount of salt water and there is a daily decrease in the bottom-hole pressure. An average of 18 per cent of the field's production is reported to be salt water, with some wells making as high as 80 to 90 per cent water.

Excessive production of salt water is believed to be one of the chief causes for the steady drop in bottom-hole pressure. Engineers feel that some method of disposing of the salt

water should be evolved in the interest of preserving reservoir pressure, and to avoid pollution of streams.

There is a strong demand for both oil and gas from the field. The crude is filling a need in the war effort and gas is being utilized for vital war industries. After being stripped of its natural gasoline and sulfur content, the gas for the most part, is being utilized by refiners for fuel.

Oil Men Thank Army Hosts For Fort Belvoir Visit

WASHINGTON, D. C. — In commemoration of the 26 hours of Army life experienced by some 70 oil-company executives on June 2 and 3, the Petroleum Industry War Council has presented two trophies to the Sixth Battalion of the Engineer Replacement Training Center at Fort Belvoir, Virginia.

The major trophy, to be held by the company of the Sixth Battalion holding the highest score in rifle marksmanship during each training period, was presented at a banquet given to the officers of the ERTC by the PIWC at Fort Belvoir July 9. Another trophy, to be held by the platoon with the highest score, will be presented at a banquet for noncommissioned officers of the Sixth Battalion next week.

The presentation at the officers' banquet was made by William R. Boyd, Jr., chairman of the PIWC, and was accepted by Maj. Sam Tabet, commander of the Sixth Battalion, who acted as toastmaster, and by Brig. Gen. Lehman W. Miller, commanding general of the Engineer Replacement Training Center.

In a brief speech, Mr. Boyd praised the replacement center for its training methods and thanked the Sixth Battalion for acting as hosts to the oil executives. He said it was the unanimous opinion of all the oil men in the party, most of whom were top executives of large corporations, that the experience at Fort Belvoir had given them a much better understanding of the Army's problems in addition to being a novel and enjoyable outing, and that the trip was a very worthwhile experiment in Army-industry relations. To show their appreciation, he said, the men took up a voluntary collection which provided the funds for the trophies, the banquets, and a contribution to the camp recreation fund.

Capt. S. D. Swann, chief, public-relations branch; William Boyd, chairman of the PIWC; Maj. Sam Tabet, commanding officer, Sixth Battalion, ERTC, and Brig. Gen. Lehman W. Miller, commanding general, Engineer Replacement Training Center, Fort Belvoir, Virginia

P. C. Boyle, Journal's Founder, To Be Honored By Maritime Commission

WASHINGTON, D. C.—The name of Patrick C. Boyle, founder of The Oil and Gas Journal, the Oil City (Pa.) Derrick, and widely known throughout the early oil fields of the nation, will be honored in the near future by assignment to one of the Liberty ships soon to be launched.

Confirmation of the decision to so honor Mr. Boyle was issued here this week by Adm. E. S. Land, chairman of the U. S. Maritime Commission, in a communication to Rep. Leon H. Gavin of Pennsylvania.

"I am happy to advise you that the name Patrick C. Boyle," Admiral Land wrote Representative Gavin, "will be assigned in the next list for Liberty ships going forward within the next week or two to the Bethlehem Fairfield Ship Yards at Baltimore."

Mr. Boyle will be the first of the early leaders in the field of journalism and oil to be honored in this manner by the Maritime Commission. It was owing, in a large measure, to his work in the news field that his name was selected as one to be assigned to a United States cargo vessel. He established The Oil and Gas Journal in 1910, 25 years after founding the Oil City Derrick. He was a charter member of the Associated Press and was among those instrumental in laying the foundation for that world-wide agency of news gathering.

Four Oil Products Added To Exclusion Order M-201

WASHINGTON, D. C.—Preference Rating Exclusion Order M-201 as amended July 9 by the War Production Board includes four new items in the list of petroleum products for which preference ratings may not be used in obtaining supplies.

Naphtha, petroleum insecticide bases, petroleum wax and petrolatum (commonly known as petroleum jelly) are the four new products for which preference ratings may not be used. In addition, the definition of lubricating oil has been changed in the amended order to include oil which is used for, or is suitable for lubrication, including but not limited to, cutting, drawing, processing, soluble transformer and white oils, which do not contain in excess of 50 per cent by weight of additives or compounds.

Applications for exception to the order shall be made to the Petroleum Administration for War on Form PD-1A, and accompanied by a letter in triplicate stating the reasons for the exception.

Completion of All 1943 Aviation-Fuel Projects Assured by AA-1 Rating

WASHINGTON, D. C. — All obstacles to prompt completion of aviation-gasoline plants on the 1943 construction program were leveled here last week when the War Production Board assigned AA-1 preference ratings to all such projects. The AA-1 rating is in recognition of the "special urgency of all of the 1943 100-octane plant construction programs," according to J. A. Krug, vice chairman of the WPB.

Some of the projected plants previously held this top military rating and others had the benefit of special directives, but a large number of units with total productive capacity more than double the prewar manufacturing level have had to "scramble" for materials with the lower AA-2X rating.

Ralph K. Davies, acting petroleum administrator, hailed the order as a "great help in the advancement of this all-important program." He said a number of plants which have been competing with other war industries for materials under the old AA-2X rating will now be assured of completion this year.

Meanwhile, it was learned that companion projects to the aviation-gasoline plants, such as units for the manufacture of hydrofluoric acid, the catalyst used extensively in most alkylation operations, have been working under top priority ratings. Upgrading of the processing units probably became necessary to keep the two elements in the equation in balance.

The WPB announcement neither specified the number of plants which will now enjoy this super-priority rating nor disclosed their locations.

Penn Grade Association Elects New Officers

OIL CITY, Pa.—Directors of the Pennsylvania Grade Crude Oil Association, meeting for the first time after their election at the recent annual meeting of the organization in Pittsburgh, have chosen the following as officers to serve for the current year:

Don T. Andrus, of Andrus & McDowell, Bradford, Pa., president; Arthur C. Simmons of the Simmons Oil Corp., Bradford, first vice president; D. T. Ring, Preston Oil Co., Columbus, Ohio, second vice president; Samuel Messer and Walter R. Reitz, both of the Quaker State Oil Refining Corp., Oil City, treasurer and assistant treasurer, respectively.

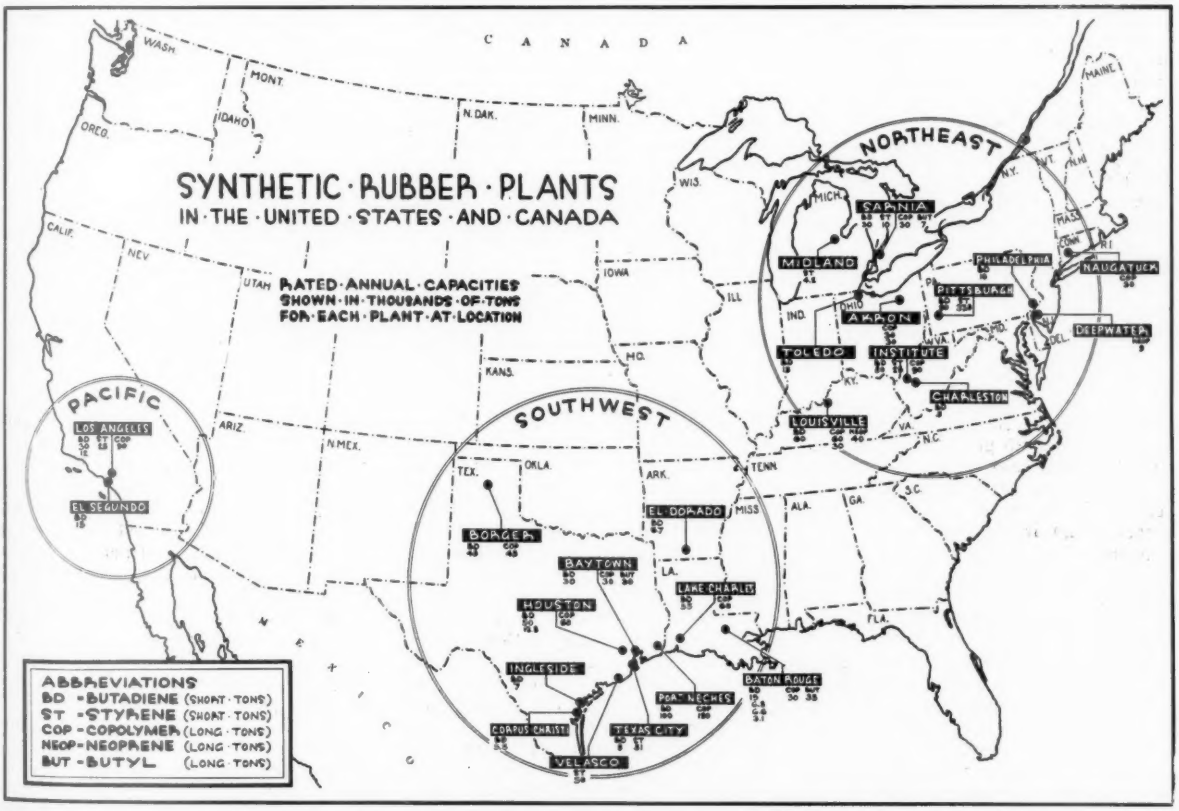
Mr. Andrus, the new chief officer, has been a prominent oil producer in the Bradford district for years and formerly was president of the producers' association in that field. He succeeds Parker L. Melvin, also of Bradford, in the post of president.

Nine new directors were elected to the board at the annual meeting, six of them producers; two of the new members are refiners and one is a representative of the jobber classification. In addition to Mr. Simmons, the new producer members of the board are:

Philip N. Faine, New Straitsville, Ohio; Coy C. Hogg, Pleasantville, Pa.; George Holbrook, Wellsville, N. Y.; R. D. Startzman, Parkersburg, W. Va., and R. T. Zook, Bradford, Pa.

The refiner representatives are Paul Beck of Butler, Pa., and J. B. Fisher of Bradford. The new jobber representative is R. J. Purkins of the William C. Robinson Sons Co., Baltimore, Md.

LOCATION AND CAPACITY OF ALL PLANTS IN THE SYNTHETIC-RUBBER PROGRAM



Distribution of North America's synthetic-rubber plants which will be virtually completed by the end of this year. New plants are coming on stream nearly every month and will attain an accelerated completion pace over the remaining 5½ months

Processing Men Show Keen Interest in How to Handle Hydrofluoric Acid

by H. Stanley Norman

ADVICE on the proper materials and practices for the safe handling of anhydrous hydrofluoric acid, one of the new catalysts receiving wide application in aviation-gasoline plants now in operation or under construction was given in Tulsa July 9. More than 125 technical men, representing refiners in the Mid-Continent, Texas and as far west as California, responded to the invitation of the Western Petroleum Refiners Association to hear Charles M. Fehr, chemist, Pennsylvania Salt Manufacturing Co., Philadelphia, and technical adviser to Ozark Chemical Co., Tulsa.

Interest in Mr. Fehr's paper, "How to Handle Anhydrous Hydrofluoric Acid Safely" was attested by the questions asked by technical men, chiefly concerning equipment recommendations. Mr. Fehr has spent more than 21 years on research, process development and manufacturing methods of hydrofluoric acid.

Because of the increasing number of alkylation plants scheduled for completion over the next several months, most of Mr. Fehr's paper on how to handle anhydrous hydrofluoric acid will be published in the Engineering and Operating Section of the Journal, July 22

Safety Must Be Observed

Emphasis was placed throughout Mr. Fehr's paper on the fact that anhydrous hydrofluoric acid, shipped to refiners at concentration above 99 per cent, need not be considered a hazardous material if properly confined and handled. He cautioned, however, that rigid safety practices are essential and that without proper precautions the highly active chemical may cause serious burns.

Corrosive characteristics of AHF undergo almost complete reversal between 65 and 80 per cent concentration, Mr. Fehr said. Below 65 per cent, the acid has a low corrosion rate on lead, while above 65 to 70 per cent, it attacks lead increasingly rapidly. At concentrations below 60 per cent, HF has a high corrosion rate on steel while above 80 per cent, practically no action occurs on steel of good composition.

Particular caution was recommended for refiners utilizing AHF in the draining of unloading lines. Extreme caution should be exercised, the speaker said, in making absolutely certain that acid lines have been drained, flushed and purged before valves are opened. Hand tools used in the acid plant are a potential source of danger, he said, and advised operators to confine all such instruments exclusively to the acid-plant area and forbid outside workmen from touching them under any circumstance.

Long flushing with luke-warm water is the first emergency treatment recommended for burns resulting from contact of the skin with AHF. In severe cases, the shock from AHF burns is serious and may prove fatal unless proper treatment is applied.

Monel metal, he said, according to his company's experience, is one of the most satisfactory commercially available nonferrous materials for handling AHF, although present restrictions on the use of nickel alloys makes steel preferable wherever possible.

He recommended seal welding of all pipe joints in facilities handling concentrated acid, although this was based largely on experience with pipe considerably smaller than in general refinery use. One of the most troublesome problems is that of obtaining suitable packing for valves. He said the ideal pump packing should be resistant to the acid, have compressibility and should not score the shaft. A copper-foil packing, with some of the rings containing a neoprene or koroseal core, he said he understood, is satisfactory both for valves and for pumps.

Congressional Committees Agree In Approving Higher Ceilings

WASHINGTON, D. C. — Adjournment of Congress for a summer recess found every committee which has investigated the petroleum situation on record as favoring higher prices for crude oil and greater centralization of authority over the industry in the Petroleum Administration for War.

Printed reports were filed by two committees, the special Senate committee to investigate gasoline and fuel-oil shortages, headed by Sen. Francis Maloney of Connecticut, and the petroleum subcommittee of the House committee on interstate and foreign commerce, headed by Rep. Clarence F. Lea of California.

A subcommittee of the House naval affairs committee has recently been holding hearings on the oil situation in various parts of the country and will make a report in the fall, but its chairman, Rep. L. Mendel Rivers of Georgia, gave a preview of the report in a speech in the House. Likewise, the unofficial "East Coast bloc," headed by Rep. Fred A. Hartley, Jr., of New Jersey, issued a statement of its conclusions.

The findings of all four of these groups are remarkably similar. All concluded that nation-wide shortages of gasoline and fuel oil might be expected for the duration of the war, that an over-all shortage of crude may develop unless there are new discoveries soon, that an increase in the price of crude is imperative, and that the PAW should be given greater powers over prices, rationing, and other aspects of petroleum production

and distribution. Some of the lesser recommendations are peculiar to one group or another, but the same general trend runs through all.

The Maloney committee was concerned chiefly with the East Coast shortage. It recommended a thorough overhaul of the gasoline and fuel-oil rationing systems, better coordination of distribution by local areas, and several measures for increasing tank-car and barge movements of petroleum products from the Middle West to the East Coast area.

The Lea committee report was a general review of the oil situation and its importance in connection with the war, and dwelt at some length on the needs for increasing known producible reserves of crude. It was severely critical of attitude of the Office of Price Administration in consistently refusing to increase crude-price ceilings in spite of PAW recommendations, and made a strong case for the need for higher prices to maintain production and exploration.

Representative Rivers reached much the same conclusions, though he was rather critical of PAW for red tape, delay, and centralized control of the industry in Washington. He mentioned particularly uniform well-spacing regulations, delays in issuing drilling permits, and low monthly production quotas for certain states as factors contributing to declining crude production, and urged the construction of more pipe lines from the Southwest, particularly one from Mississippi to Georgia.

Ceiling Placed on Ethyl Sales at Pittsburgh

WASHINGTON, D. C. — A ceiling price in Pittsburgh, Pa., of 9.9 cents per gallon f.o.b. the seller's terminal was set by the Office of Price Administration July 10 for sales of Ethyl gasoline in bulk by one refiner to other refiners.

Sales between refiners, it was explained, have arisen chiefly through compliance with Directive 59 of the Petroleum Administrator for War. This caused rerouting of pipe-line supplies of gasoline and other petroleum products and in at least one instance (in which operation of a pipe-line was reversed) caused a refiner who formerly depended upon supplies of his own product to buy Ethyl gasoline from other refiners.

Stanolind Discontinues Hamilton Dome Posting

DENVER, Colo.—The Stanolind Oil & Gas Co. discontinued posting field prices on Hamilton Dome crude, effective June 10. The production is now going to the Empire State Oil Co. Output of field in 1942 was 424,624 bbl.

Federal Order Digest

WPB Orders

Laboratory Equipment—PRO P-98-b, Amendment 1: Authorizes use of allotment symbol MRO-P-98-b and preference rating of AA-1, except for material used in retail marketing and exclusive of items on Schedule C of PR 3, issued July 9.

Petroleum Marketing—PRO P-98-c, Amendment 1: Revises language forcing compliance with PAW Materials Redistribution Program 2, effective July 9.

Heat Exchangers — GLO L-172, amended: Brings additional types of heat exchangers under control of WPB for the purpose of channeling critical types and sizes into essential war industry and military use, effective July 9.

Special Order—Revoked Amerada Petroleum Corp. preference rating for eight centrifugal pumps with gas engines in Fresno County, California, and Shell Pipe Line Corp. rating for one-story building to house meters at Deer Park, Tex.

Hand Tools—CMPR 5, Direction 9: Authorizes employes to use CMPR 5 preference rating assigned to employer under certain circumstances for procurement of tools, issued July 10.

Exclusion Order — PREO M-201, amended: Prevents use of preference ratings for procurement of naphtha, petroleum insecticide bases, petroleum wax and petrolatum, issued July 9.

Priorities Regulation—PR 7: Clarifies use of endorsement on certification of purchase orders required by WPB. Insists on manual endorsement or manual initialing of records showing facsimile was used, issued July 6.

PAW Regulations

Materials — PAW Redistribution Program 2: Requires all operators to report surplus inventories of specified critical materials before they can qualify for preference ratings, issued July 9, effective July 1.

Appointments—Assigns Wirt Franklin to special duty dealing with expansion of exploration, working from Deputy Administrator Davies' office; W. W. Vandeveer, president, Allied Oil Co., to post of director in charge of District 2.

OPA Regulations

Crude Oil—RPS 88, Amendment 114: Preserves differentials established in contracts between producers and purchasers, when specific maximum price is set for an individual area, effective July 14.

Petroleum Coke—RPS 88, Amendment 113: Places sales, except when sold to resellers for use as fuel, under the petroleum-products regulation, removing transactions from General Maximum Price Regulation, effective July 12.

Agricultural Fuel—RO 11, Amendment 70: Provides method of getting necessary petroleum supplies for agricultural equipment, regardless of when facilities were acquired, effective July 14.

Gasoline—RO 5c, Amendment 66: Revokes provisions for issuance of temporary transport rations because need of this emergency measure has expired, effective July 16.

Ethyl Gasoline—RPS 88, Amendment 115: Sets ceiling price of 9.9 cents per gallon, f.o.b. sellers' terminals, Pittsburgh, Pa., for sales in bulk from one refiner to another, effective July 16.

Gasoline—RO 5c (amendment not yet numbered): Permits use of A cards in northeastern shortage area for one round trip to a summer home or vacation spot.

Fourth Edition Issued on Hydrocarbon Constants

At the request of the technical advisory committee of the Petroleum Industry War Council, a fourth edition of "Physical Constants of the Principal Hydrocarbons" by M. P. Doss has been prepared and is available from the Texas Co. at a cost of $3.75 per copy, which represents only the cost of printing and binding. Requests for copies should be addressed to M. P. Doss, The Texas Co., 135 East Forty-second Street, New York.

The third edition of this publication, issued in March 1942 contained 215 pages and listed properties of nearly 2,000 hydrocarbons. More than 100 pages in the new edition have been revised to include new or corrected data, particularly on the hydrocarbons related to the manufacture of aviation gasoline, synthetic rubber, synthetic resins and toluene.

Compact Bill Is Signed by President

WASHINGTON, D. C. — A resolution extending to 4 years beyond September 1 the consent of Congress for the operation of interstate oil compacts, to conserve oil and gas, was signed by President Roosevelt on July 7. The Interstate Compact was executed in Dallas, Tex., February 16, 1935, by representatives of oil-producing states.

W. W. Vandeveer Is Appointed Director in Charge of District 2

CHICAGO, Ill.—Direction of affairs for the Petroleum Administration for War in District 2 this week were assigned to W. W. Vandeveer, president of the Allied Oil Co., Cleveland, Ohio. Appointment of Mr. Vandeveer as director in charge was announced in Washington, D. C., by Ralph K. Davies, deputy petroleum administrator, to fill a vacancy created by promotion of Wirt Franklin to special duty as expediter of exploratory drilling.

The post of District 2 director of production, a title previously vested in Mr. Franklin along with that of director in charge, probably will be filled by promotion of C. C. Brown, assistant district director of production, assigned to the Tulsa suboffice.

Mr. Vandeveer assumed his new government duties July 14, after 21 years' experience in the marketing, production, refining, and transportation branches of the oil industry. He entered the industry in 1922 to become associated with the American Petroleum Products Co., Cleveland. On July 15, 1925, with F. R. Newman, he organized the Allied Oil Co. and has since operated that concern.

Interested in Several Companies

He is an officer of three other oil firms in addition to the Allied company. These concerns include Canton Refining Co., which has a 7,000-bbl. refinery at Canton, Ohio; Cleveland Tankers, Inc., which owns and operates four Great Lake tankers; and Central Pipe Line Co., which operates as a crude-oil gatherer and purchaser in southern Illinois and in Texas.

He has served as a member of the District 2 industry committee on transportation and has headed its subcommittee on Great Lakes tankers. He has been a member of the supply and distribution committee and of the natural gas and natural gasoline committee. He also was a member of the industry advisory panel which aided OPA in revising its fuel-oil ration program.

Mr. Franklin accepted a new PAW post as special field assistant, attached to the deputy administrator's office. His new duties were not specifically outlined by Administrator Ickes in announcing the appointment but, by inference, Mr. Franklin is to become a sort of "roving center" to bolster up the exploratory program wherever PAW assistance will be of aid in furthering plans or in launching projects.

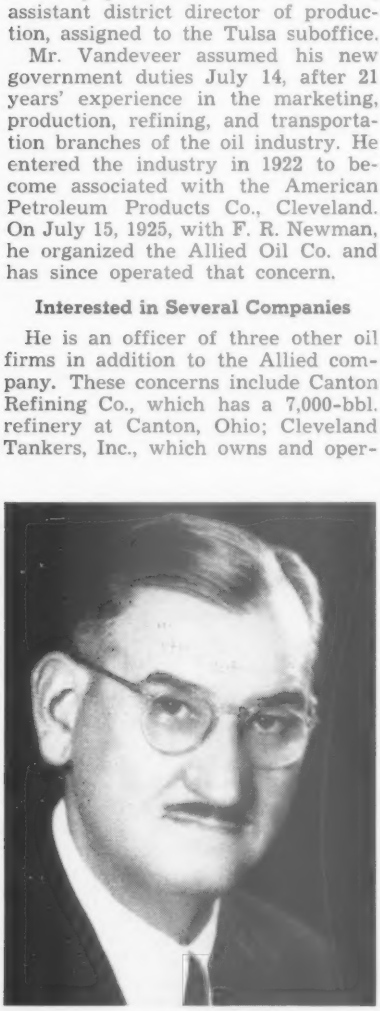
"The nation is threatened with an imminent shortage of crude-oil production," axplained Deputy Administrator Davies, "and it is of paramount importance that the PAW further expand its activities in such a manner as to bring about, so far as lies within its power, increased search for oil. the installation for greatly expanded secondary-recovery operations, and the further encouragement of conservation practices.

"We are particularly fortunate in having on the staff of PAW a man whose life-time of experience in the oil industry has so well prepared him to aid us in this important task. The urgent necessity of improving the nation's production position is such that we have asked Mr. Franklin to apply his unique training and experience to a problem national rather than local in scope."

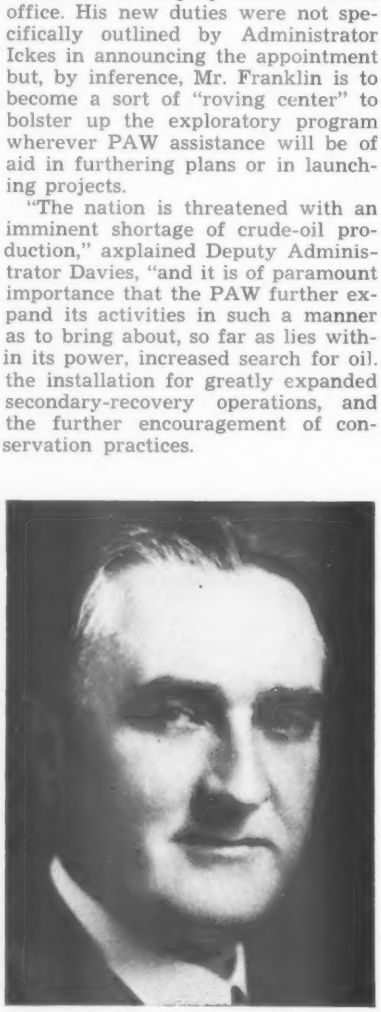
Background in Production

During his many years of activity Mr. Franklin was known as one of the most prominent and successful wildcatters in the oil industry. Commencing with the discovery of the famous Healdton pool in Oklahoma over three decades ago and continuing through the development of many of the most important Mid-Continent fields, Mr. Franklin's record has been outstanding. It was in a large measure as a result of his exploratory activities that the great Oklahoma City field was discovered in 1928.

Mr. Franklin was also one of the founders and the first president of the Independent Petroleum Association of America, which office he held for many years. He was chairman of the Planning and Coordination Committee during the days of the petroleum code. Mr. Franklin's official headquarters will be in Washington, but it is expected that the greater portion of his time will be spent in the field with the producers and the producing companies.



W. W. VANDEVEER



WIRT FRANKLIN

Shale and Coal to Be Studied As Sources of Petroleum

WASHINGTON, D. C.—Congressional investigation of the nation's reserve petroleum products contained in coal from the western states will be made this summer. Senator O'Mahoney of Wyoming, head of the Senate western minerals committee, will open hearings in Washington August 3 and will resume later in the month in Pittsburgh, Pa., where the Bureau of Mines has a pilot hydrogenation plant.

After stopping in Pittsburgh, the committee will meet in Salt Lake City, Utah, and at Sheridan, Wyo., to review lignite prospects in the various Rocky Mountain states.

Earlier hearings have shown, Senator O'Mahoney said, that there is a 2,000-year supply of coal in the United States and vast quantities of oil shale in the western states representing 92 billion barrels of oil under extraction processes developed at a Colorado plant of the Bureau of Mines.

Dr. W. C. Schoeder of the Bureau of Mines, who has just returned from England, reported that the British are making more than 1,000,000 bbl. of gasoline annually from coal by hydrogenation processes.

California Discovery-Bonus Plan Intended To Stimulate Exploratory Drilling Program

by L. P. Stockman

LOS ANGELES, Calif.—The necessity of substantially increasing wildcat exploration in California in order to at least maintain current production and reserves, prompted the PAW District 5 production committee to grant a bonus allowable to any well successfully completed and credited with the discovery of a new pool or field.

This special allowable, oil operators asserted this week, should prove an incentive for California prospectors as it has always been claimed that it took a discovery well too long to pay out under existing conditions. Consequently, it was more advantageous to concentrate drilling activities in proved fields where the risk was less.

Depth Scale Established

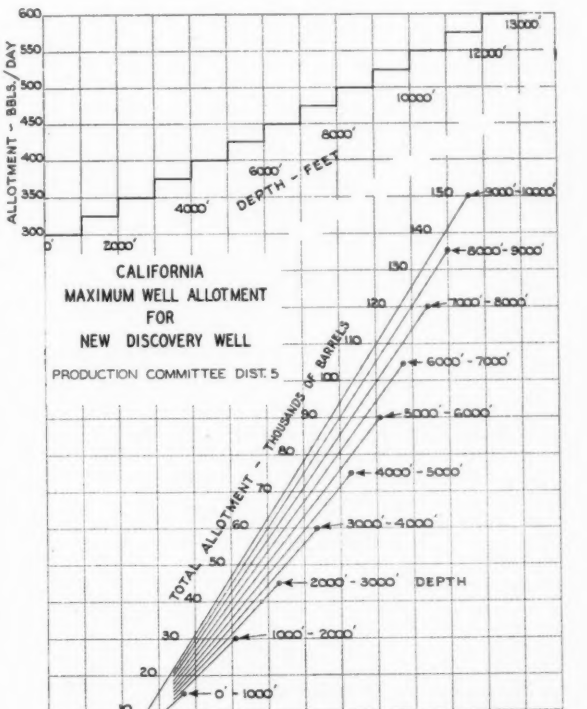
The bonus allocation to discovery wells increases progressively with depth as the committee has prescribed both the total barrels to be allocated and the permitted rate of daily production. A shallow well, drilled to a depth of 2,000 ft., would be given a total allocation of 30,000 bbl. to be produced at a daily rate not to exceed 325 bbl., whereas a deep well completed at 10,000 ft. would receive a total allocation of 150,000 bbl. to be produced at a daily rate of 525 bbl. The scale adopted by the production committee is graduated for intermediate depths. In order to make the order effective to the maximum extent, the production committee ruled that all discoveries subsequent to May 1, 1943, would be eligible for participation in the bonus allowable. To all intents and purposes the order is effective currently as there were no new important discoveries chalked up during May. The only exception to the bonus arrangement involves discovery wells with high gas-oil ratios where the natural gas produced with the crude cannot be utilized or where production cannot be transported and marketed. Completion of an offset well located in the same pool within 1,320 ft. of the discovery well automatically terminates the bonus allotment. This latter provision was adopted to enhance the use of a wide well-spacing program, retard drilling and prevent unnecessary drainage. The graduated scale adopted by the production committee for District 5 is as follows:

Depth in feet—	Total barrels	Barrels per day
Less than 1,000	15,000	300
1,000- 2,000	30,000	325
2,000- 3,000	45,000	350
3,000- 4,000	60,000	375
4,000- 5,000	75,000	400
5,000- 6,000	90,000	425
6,000- 7,000	105,000	450
7,000- 8,000	120,000	475
8,000- 9,000	135,000	500
9,000-10,000	150,000	525
10,000-11,000	165,000	550
11,000-12,000	180,000	575
12,000-13,000	195,000	600

In adopting the progressive scale for discovery wells, the committee prescribed that it shall be applicable only after the discovery is certified by the production committee, and to those wells only if and for so long as they are determined by the engineering subcommittee to have reasonable gas-oil ratios. Any certified well incapable of producing crude at its rate indicated on the scale shall be permitted to produce, subject to certain other limitations, at such rate as it is capable of producing. Should the regular allotment to any certified well be greater than the daily rate, as set forth in the scale, such well may be produced at its regular allotted rate. Subject to the limitations imposed, the new scale shall be applied to a certified well until the total authorized production shall be recovered or until the shutoff date, whichever event shall first occur. Any offset wells completed on or before the said shutoff date shall be entitled to produce, commencing on their respective dates of completion and continuing through the said shutoff date, at the same rate at which the certified well shall be entitled to produce.

The shutoff date is prescribed as being the last day of the calendar month in which the first offset well shall be completed. On the day after the shutoff date and continuing until the maximum efficient rate of production shall be established for the field or pool from which such wells produce, certified wells shall be permitted to produce in accordance with arbitrary allotments assigned by the production committee.

The production committee's resolu-



The scale of discovery allowables established for California operators plotted against depth of the producing well. Lower scale shows total allocation while the upper reflects the daily rate at which the allotment is to be withdrawn

tion also provides that notwithstanding the rates of production set forth in the production and depth scale, no certified well shall be produced at a rate in excess of that rate determined by the engineering subcommittee to be the maximum rate at which the oil can be produced from any such well without damage to the reservoir, provided, that no such determination shall be made with respect to a certified well until the engineering subcommittee shall have first given the operator thereof 30 days' written notice of its intention to make such determination.

In order to keep production of discovery wells within the limits of transportation capacities and market demand, the committee prescribes and limits the production of discovery wells. This limiting paragraph provides that no certified well shall be produced at a rate in excess of the rate at which the oil produced therefrom can be marketed, or in excess of a rate which will permit the transportation and utilization, without the installation of abnormal facilities, of all of the natural gas produced in conjunction with the oil production, provided, that notwithstanding the above or any other limitations herein contained, the operator of a certified well shall be entitled at all times to produce such well at its regular allotment.

To take care of any condition arising from the refusal of an operator to provide necessary data the committee provided that in the event the operator of a certified well shall fail or refuse to furnish to said engineering subcommittee within 10 days after receipt of request therefor, such pertinent reservoir and surface data as may be required for the purpose of making any determination with respect to such well, the right to produce in accordance with the scale shall be suspended until such data are furnished and such determination made, and during such suspension period such well shall not be produced at a rate in excess of its regular allotment.

In the past the production committee usually granted a discovery well increased production for a stipulated period of time, but usually this was not long enough to compensate for the increased costs of wildcatting. From now on prospectors will know before drilling wildcats what they can produce from discoveries.

Oklahoma's Discovery Bonus to Be Discussed

OKLAHOMA CITY, Okla. — The state Corporation Commission will hold an open hearing on July 27 in the commission's courtroom to discuss a report by the discovery-allowable committee. Scheduled for discussion is a suggested method of increasing discovery of new pools in the state by granting bonus allowable. The committee and the various operators will seek an acceptable formula to submit to the Corporation Commission for formal adoption on the following day, when the regular market-demand hearing is scheduled.

Kentucky Association Arranges for Six Speakers

ASHLAND, Ky.—Six addresses on current problems in the petroleum industry will feature the annual meeting here at the Henry Clay Hotel July 24 of the Kentucky Oil and Gas Association.

Another highlight of the meeting will be a tour of the Ashland Oil & Refining Co.'s Leach plant, including facilities for production of 100-octane-gasoline components and other special products.

Officers of the association, now headed by N. W. Shiarella, Owensboro, Ky., president, will be elected at a dinner meeting July 23.

The Program

10:15 a.m.—Morning session—dining room, Henry Clay Hotel—Dr. A. C. McFarlan, head of geological department, University of Kentucky, presiding.

Charles B. McClintock—Division of Secondary Recovery—Production Division, Petroleum Administrator for War, Washington, D. C.—"Water Flooding in the War Program."

Frank M. Brewster—director of Region 1, Division of Natural Gas and Gasoline, PAW—"Can the Appalachian Region Produce Enough Gas for the Coming Winter?"

12:15 p.m.—Luncheon—ballroom, Henry Clay Hotel—John T. Diederich, attorney, Ashland, Ky., presiding.

Address—W. B. Heroy, director of reserves, PAW—"Practical Conservation."

2 to 5 p.m.—Tour of Ashland Oil & Refining Co.'s Leach plant, including new government 100-octane and special-products units, or golf at Bellefonte Country Club.

5 to 6.30 p.m.—Cocktail and julep hour, Bellefonte Country Club.

7 p.m.—Annual dinner, Henry Clay Hotel, ballroom. Toastmaster—Paul G. Blazer, president Ashland Oil & Refining Co.

Address—Don R. Knowlton, director of production, PAW—"Production Problems Confronting the Oil Industry in the War Program."

Address—Harold B. Fell, executive vice-president, I.P.A.A., Ardmore, Okla.—"Efforts of Present Trends on the Independent in the Petroleum Industry."

DEATHS

Y. C. Paschal, 27, former Texas Tech football star and coach of the Nocona, Tex., High School football team, was crushed to death last week when the traveling block and elevators fell after a drilling line broke on a wildcat oil well where he was working 4 miles west of Nocona. His widow survives.

J. M. McCarter, oil man of Tyler, Tex., was killed last week when the automobile in which he was riding collided with a truck. A companion, H. K. Spears, also an oil man, was injured.

Dr. Frank Lou Patton, 36, assistant director of Reserves Division of PAW, accidentally shot himself to death at his home in Houston, Tex., while cleaning a shotgun preparatory to packing it in connection with the family's plans to move to Washington, D. C.

Jack Wesley Cain, 59, a veteran oil-well driller, died last week following a heart attack. He had been working in Lovington, N. M., for 2 years. Prior to that he had resided at Big Spring, Tex., for 12 years. His widow, two sons and three daughters survive.

Wilson V. Strait, 54, for 30 years an employe of Potter County Gas Co. and North Penn Gas Co., died at his home near Port Allegany, Pa. His widow, a son and four daughters survive.

J. Newt Brown, 45, an employe of Texas Co., died at his home in Electra, Tex., last week. He is survived by his widow, a son and two daughters.

D. M. Edmonds, 55, died in a Bradford, Pa., hospital, last week. Mr. Edmonds had followed the oil business in all its phases and for 8 years before his illness was employed by Kendall Refining Co. His widow and two daughters survive.

Hugh V. Smith, independent oil operator in the Cisco-Putnam, Texas, area, died June 27. He had been ill of a heart ailment for several years, and had been in a sanitarium for 2 years. Mr. Smith was a native of Bradford, Pa. His widow and a son survive.

Walter Herman Ledebur, 58, for 24 years a lease foreman in the Bradford, Pa., field, died suddenly at his home near Bradford. He had been in ill health for several years, but his condition had not been serious. His widow, two sons and a daughter survive.

A. J. Weideman, 54, an independent operator in Michigan and formerly of Ohio, died July 7 at Mount Pleasant, Mich. He served as state oil umpire from 1933 to 1936, and was executive secretary of the Oil and Gas Association of Michigan from 1937 until his retirement in 1942. He was a member of the state legislature in 1937-38. He started in the oil industry in 1909 with Standard Oil Co. of California.

Clifford M. Ewens, Sr., 66, executive assistant to O. H. Carlisle, division manager of the Gulf Oil Corp., died at his home at Houston. He has been with the Gulf Oil Corp. 40 years.

Fitting Pumping Practices to Individual Wells Yields Best Results

by Harry F. Simons

Oil wells encounter widely different conditions in the pay and variations in completion methods often cause their response to pumping to vary from the expected behavior. A few examples are given which show the losses which may result from absolute conformity to general practice in all cases.

INDIVIDUAL well study has come to be more than a pleasant sounding phrase at this particular time when most organizations are fighting for every possible barrel of production. The necessity for considering the characteristics of each well is becoming fully realized with the result that in many cases the production from wells is being increased by rather simple changes.

The extent to which consideration of the individual well and lease can go is illustrated by the case of one independent company headed by a competent major-oil-company-trained engineer. It was noticed that when the pumper on a particular lease was not instructed as to the pumping schedule to follow, production from the lease increased. The wells were in the settled production stage. On talking to the pumper the manager found him with a sound conception of oil production. He also learned that the pumper had spent considerable time in thinking about the characteristics of the well and was convinced a change in operation would benefit production.

As experience had already shown a favorable result, it was decided to let the pumper devise his own pumping schedule. The change merely consisted of more frequent pumping periods of shorter duration. The total time the wells were pumped daily was reduced. An engineering study of the wells would have shown the change desirable but at the present time trained men are not available for all the work at hand and consequently, this property, and many others similar to it, operate below maximum efficiency.

The above is an isolated case and it is not meant to indicate that it would be a good thing if all properties were suddenly given into the charge of the pumpers. It does show that rather simple changes, based on knowledge, reasoning and the best opinion available among a group of operating men can result in production increases.

One engineer in the West Texas area contends that the acceptance of generalities on the correct methods to apply to oil production probably causes as much oil to go unproduced as any other single factor. This engineer contends that the expressions, "Never pump a well off," "Always pump off bottom," and "Get the pump as near bottom as possible," should all be qualified by, "Unless there is a reason for doing otherwise."

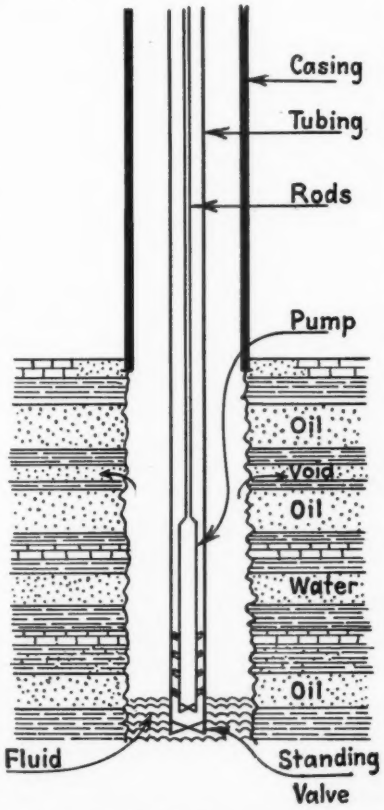


Fig. 1—Condition where exposing sand face appears desirable. Oil can escape into void sand or it can be held in pay zones by water filling up well bore

In discussing wells being artificially lifted, and particularly those which make 25 bbl. per day or less, this engineer points out that the reason for never pumping a well off is that the formation becomes clogged and oil remains in the sand instead of entering the well bore. This necessitates either cleaning the sand face by scratching, bailing out, sand pumping, or washing with either oil, distillate or chemicals. If the sand face is kept covered with formation oil, the plugging material is generally retained and is pumped out of the well.

The object in pumping off bottom is the removal of the heavier fluid (water) from the well bore. If a well making some water was shut down for any length of time and provisions were not made to pump or lift the production off bottom, a gravity sep-

aration would take place and the lower portion of the sand would be covered with water. It is possible to pump or lift the production of the well off bottom without ever exposing the face of the formation.

The third statement, getting the pump or lifting mechanism as near bottom as possible, is due to an increase in efficiency of the lifting medium with submergence. Rather phenomenal results in the way of production increases have been obtained in many cases by changes of 15 to 30 ft. However, one trouble frequently arising from locating the pump at or near bottom is the increase in wear of the cylinder and piston due to sand entrained in the oil. Also, the standing valve may sand up and necessitate a pulling of the pump in case the well is ever shut down for any considerable time.

Under a number of formational conditions, it may be well to discard, or at least modify, the rule about never exposing the sand face. As an example, a well with a pay formation containing productive strata alternating with nonproductive porous strata or water-productive zones separated by impervious streaks might lose considerable production by not exposing the sand face. If the nonproductive porous zones contain no pressure the oil can flow into the well bore and then flow out again.

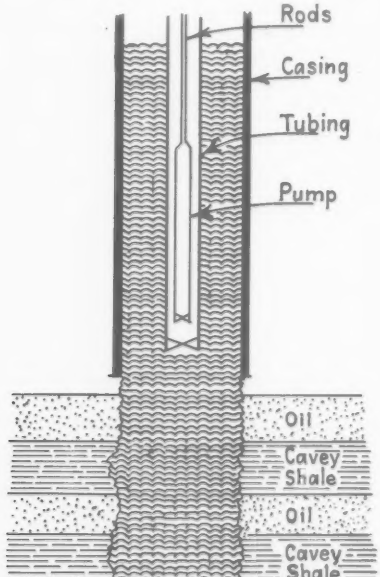


Fig. 2—High pump setting leaves fluid in hole to help support cavey formations, and allows fine sand to settle out instead of passing through pump

If there is water in one or more of the zones intermingled with the oil-pay strata, the water flows into the well bore and, if it carries a slightly greater pressure, movement of oil into the well bore is retarded. Or, the rate of flow of the water-bearing zone may be slightly higher than the oil-producing zone and consequently the well fills up with a fluid which is mostly water.

Specimen Production Increase

One Permian basin superintendent was able to boost his production from a lease from around 7 bbl. to 18 bbl. per well by recognition of this condition. Gas lift was being used to produce the wells and he lowered the standing valve and accumulation chamber to as near bottom as possible. He also decreased the time between injections of lifting gas controlled by the intermitter. By the time ½ bbl. of fluid accumulated in the well bore, opening of the gas-lift valve lifted it to the surface. In this case it was possible to disregard the lifting gas-oil ratio as the gas supply was obtained from a well on the lease and after returning to the surface along with the oil it was separated and sold. In other words, there was no charge for the gas as it was merely used while en route to market.

The tipoff as to the condition in the well was the increase in water with no increase in oil whenever the wells were shut down for several days. As long as the wells were kept producing, only a fairly small percentage of water was produced. If production was discontinued for any length of time, the water-oil ratio went up. The conclusion was that water was excluding oil from the hole and if the water was exhausted, more oil would come in.

Where the pay zones are separated by incompetent but impervious formations, the pumping off bottom may not only produce the best results but it also might cause the tubing to become stuck in the well. Where the formation pressure is low, and no considerable head of fluid can develop, a small cave around the tubing will shut off the upper pay streaks from the bottom of the hole or will let only a small amount of oil trickle down. In many cases there is no sharp reduction in production but a gradual shutting off as the bridge becomes tighter. After the well's production dwindles it may be cleaned out and restored.

Gravel packing, running of a liner or even an attempt to cement the caving zones so they will stay in place are common remedies. Another is to keep the formation covered and to pump up the hole instead of off bottom. The fluid head may be sufficient to support the caving formations and such material as does fall into the hole goes to bottom with a gradual filling of the hole. Still another method is to simply fill the hole with gravel to the top of the uppermost caving section and then pump from near the top of the formation.

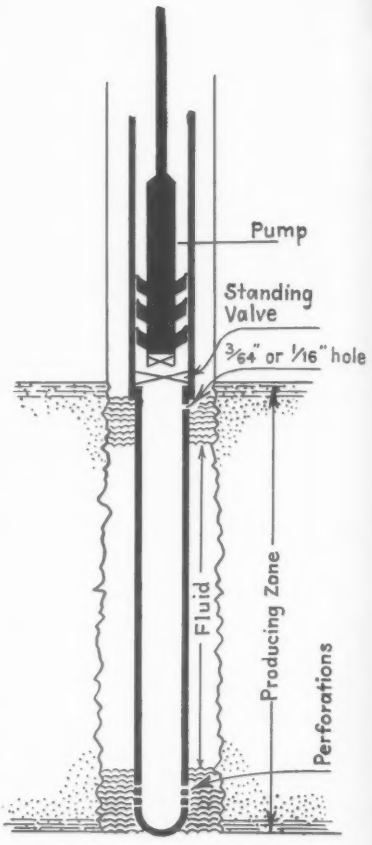
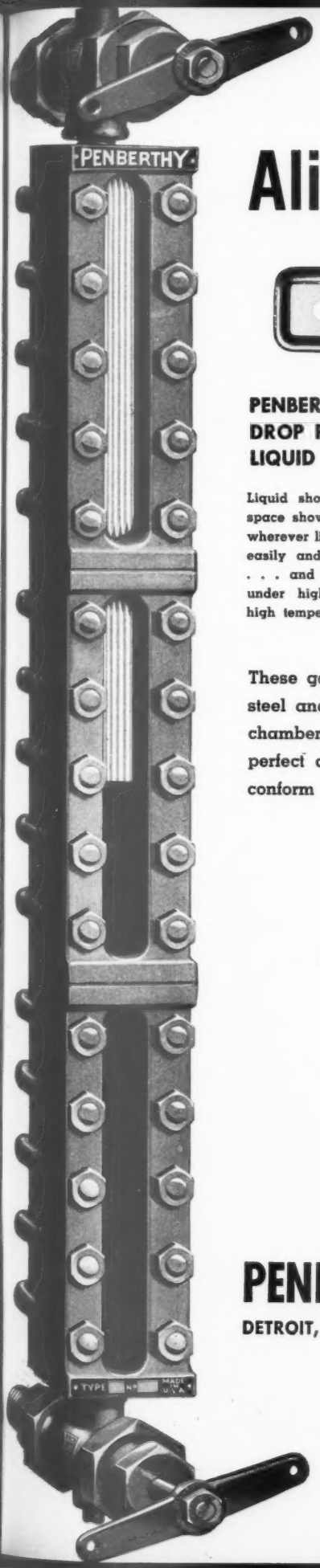


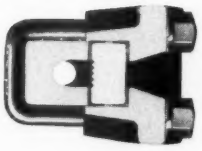
Fig. 3—Flood nipple. Perforation immediately below standing valve prevents pump from lifting fluid through perforations at bottom. Fluid always covers sand face

Incidentally, if one wants to lift oil from the bottom of the hole and still not expose the face of the sand, it can be done by the use of the flood nipple, a tool which has been used for a number of years by some production men but which has been ignored by others. This is simply an anchor with perforations near the bottom which is run below the pump. The pump is located at the top of the pay with the anchor below it. A small hole drilled in the anchor immediately below the pump prevents the fluid in the well being lowered beyond that point for as soon as this hole is exposed, the pump gets air or gas from the annulus. As long as the hole immediately below the pump is covered with fluid, most of the production enters through the regular perforations at or near bottom.

The experience of another company shows the result to be obtained by disregarding the admonition to locate the pump as near bottom as possible. In this case, there was little water associated with the production



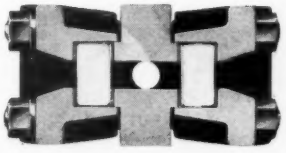
Alike in Quality



PENBERTHY *Reflex*
DROP FORGED STEEL
LIQUID LEVEL GAGES

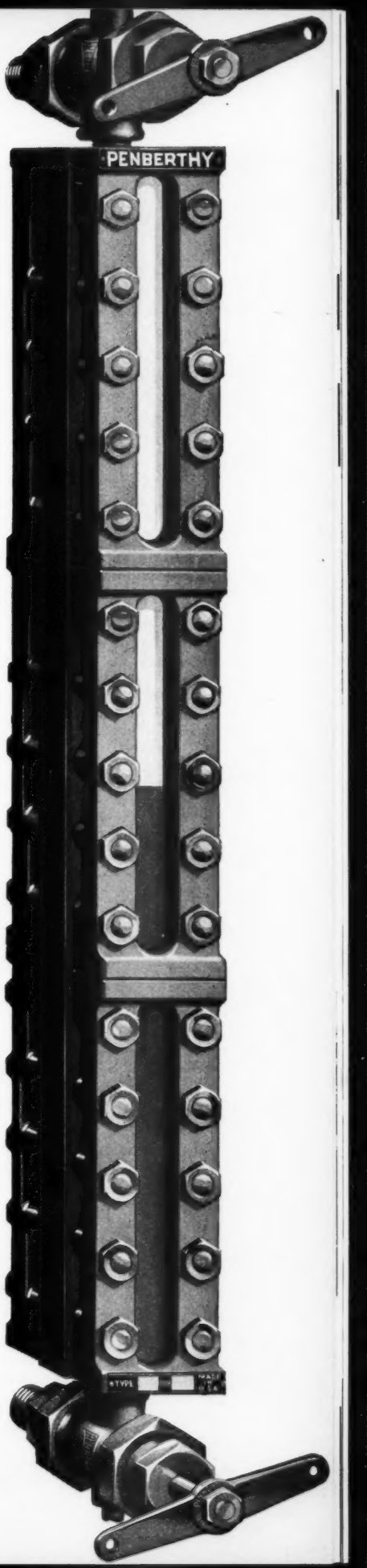
Liquid shows black — empty space shows white. Preferred wherever liquid level must be easily and positively visible . . . and when liquids are under high pressure or at high temperature.

These gages are made of alloy temperature resisting steel and are the highest quality throughout. Liquid chamber is made from a solid block of steel to assure perfect alignment and rigidity. All Penberthy gages conform with A.P.I.-A.S.M.E. requirements.



PENBERTHY
Transparent
DROP FORGED STEEL
LIQUID LEVEL GAGES

Used to observe color and density of liquids under high pressures, and/or temperatures. Construction is exceptionally rugged . . . similar to Reflex types.



PENBERTHY INJECTOR CO.

DETROIT, MICHIGAN • Canadian Plant; Windsor, Ontario

PENBERTHY PRODUCTS

and such water as was produced was connate. The producing zone was reasonably competent but the oil produced carried some fine, sharp sand into the well. Better volumetric efficiency was obtained by running the pumps at or near bottom but pump life was extremely short and pulling jobs for pump repairs were frequent.

The pumps were raised several feet above the top of the producing zone to provide a settling basin in which the sand could drop out. The speed of the pumping units was reduced and the pumping period extended slightly. The daily production with the pumps installed high was a little less than when a new pump was operated off bottom. However, when a month of operation with the pump high was compared with a similar period with the pump at or near bottom, the former production was considerably greater due to the elimination of down time and periods of pumping with very low volumetric efficiency caused by a sand-cut pump. Sanding up of the standing valve, a common trouble with the pump at or near bottom, was also eliminated.

There was no increase in the cleanout work on the wells, in fact the reverse was true as cleaning out was often formerly resorted to in an effort to reduce pump wear. The engineer in charge of this particular lease anticipates a longer time between cleanout periods with an increase in the time spent on each individual cleanout job. Total time spent in cleaning out will be less.

The economics of cleaning out wells of 5 to 10-bbl. capacity is extremely controversial. Some engineers contend that this work does not pay out while others believe just as sincerely that it does. A common reason for failure of a cleanout job to return the cost, according to one engineer, is the hurrying of the work or the allotment of only so much time to the task with the work being stopped when the specified time has elapsed. The well may or may not be satisfactorily conditioned at that time but it is put back on production with the result the investment in the work is never repaid. Another 36 or 48 hours might have seen the well actually put in proper condition.

There are corrective techniques available for shutting off water, thief zones, caving sections and sand coming into the well with the production. However, where the well's production is small the investment required to effect a positive correction is often out of proportion. Another difficulty is the establishment of the true and exact conditions. When one is attempting to shut off either a thief or water-bearing zone, the exact location of the zone must be known. If the zone is only a foot in thickness, several attempts may be required to seal it off without affecting the oil-productive capacity of the well. Because the economic margin is small, the operator is limited in what he can do in the way of actual repair work whereas alleviation or control steps are within his means.

Many of the troublesome conditions could have been avoided by proper completion procedure. This, of course, is a post-mortem approach to the problem to a certain extent except as it affects future completions.

Regardless of how the condition came to exist and the fact that techniques which are applicable to wells of high productivity are available, it is accepted that low-capacity wells must depend on management and on ingenuity to reduce or eliminate sources of operating troubles. The most important part of devising these more-or-less simple cures appears to be a study of the well's behavior by the engineer or the production superintendent. If neither of these has the time, the opinion of the farm boss and the pumper may be of considerable importance in devising means to increase the production and pull down the operating costs. Letting the facts determine the procedure appears to be more successful than basing operating procedure on general axioms.

Modifiers Aid Manufacture Of Asphalt Products

THE specific properties and characteristics of asphalts may be so varied and changed by the use of chemicals called modifiers that much greater flexibility in manufacturing processes may be attained by their use. Modifiers greatly simplify the work of the maker of commercial products in which asphalt is employed by the effect on properties of viscosity, consistency, penetration and other important properties. One of the most useful effects of modifiers is in the change effected in one property without appreciable or serious effect on another in the same material.

The properties—specifications — of asphalts are empirical properties, set by specifications worked out by experience to meet given requirements. The combinations of specification requirements are almost unlimited in number and variety, and the problem of maintaining a supply of asphalts of widely varying specifications is a huge one, that of manufacturing all these grades an even greater burden. Wartime emergency conditions now further complicate the asphalt user's situation, the number of grades being greatly reduced.

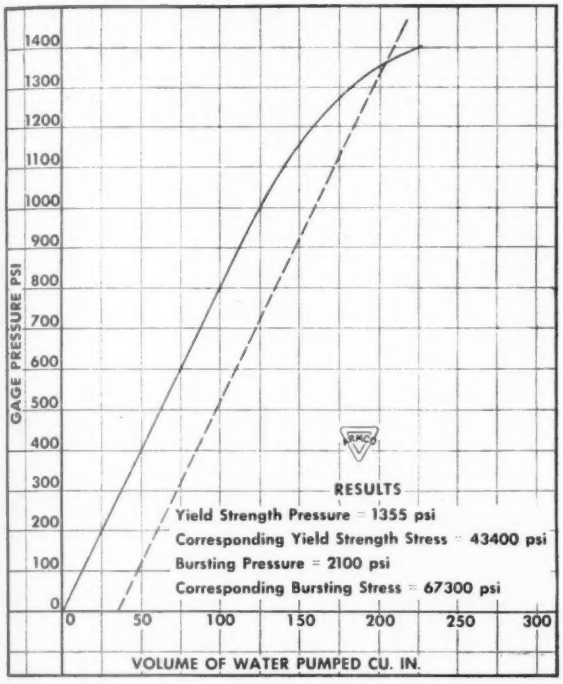
Two of these modifiers are proprietary products called abalyn and hercolyn, made by Hercules Powder Co.'s synthetics department. By the use of small proportions of these materials, for example, the viscosity at elevated temperatures can be reduced by about 15 per cent of its original value for each per cent of the modifier added. At the same time the reduction in softening point is only 1 to 2 per cent. Thus, in a given asphalt, 4 per cent of abalyn reduces the Koppers viscosity at 352.5° F. by about 45 per cent, while the softening point is reduced only about 6.5 per cent. Ten per cent of abalyn or hercolyn reduces the viscosity as much as 70 per cent, while softening point reduction is only approximately 12 per cent.

Correspondingly, a reduction of the softening point of 7 per cent by 4 per cent abalyn was accompanied by a 23 per cent increase in the penetration of the asphalt sample. To determine the coincident effect of these modifiers on various properties, a sample of asphalt of 187.5 softening point and 22 penetration was blown to raise its softening point to 191; 1 per cent of the abalyn ester restored both the original softening point and penetration. Blown to 194.5 softening point its original softening point and penetration were restored by 2 per cent abalyn. Blown still further to 201.5 softening point the original specifications were restored by 4 per cent abalyn. Four per cent abalyn reduced softening point to 174 (7.2 per cent), increased penetration to 27 (22.8 per cent).

By the use of comodifiers, viscosity reduction without loss of hardness may be accomplished. A product known as belro resin (a trade name), may be used for this purpose. Two per cent each of abalyn or hercolyn and belro resin reduced the viscosity of an asphalt from 142 to 84, held penetration at 68 (at 77° F.), reduced softening point from 176° to 166° F. Two per cent abalyn and 5 per cent belro resin did not change softening point further, reduced penetration to 60.

Similarly these products modify and improve the brittleness at low temperatures, an advantage when insulation for refrigeration or similar purposes, or asphalt coatings for severe winter weather is required. For the range of 1 to 4 per cent abalyn the impact resistance was increased about 7 per cent for each per cent of abalyn used. Some of the other advantages of use of the products in processing asphalts are: increasing saturation rate on felts, asbestos, etc.

Report on Bursting Test of Fusion-welded Pipe



Volume-pressure curves and stress calculations showing results of hydrostatic bursting test on ARMCO Spiral Welded Pipe.

In accordance with methods described in paragraph 221 of the 1942 American Standard Code for Pressure Piping, a hydrostatic pressure test was conducted on a section of spiral fusion-welded pipe.

Paragraph 221 provides a supplemental method of determining the effective yield strength of steel pipe. This yield strength then becomes a principal factor in the equation by which wall thickness is calculated for gas piping used in cross-country transportation systems. Technical data resulting from the supplemental test is of great interest to men who use spiral fusion-welded pipe.

ARMCO Spiral Welded Pipe after being hydrostatically tested to the bursting point.

Close-up of test specimen showing how fracture through wall occurred opposite the weld. No weld leaked at any time.

The test specimen was 16" O.D., .250" wall pipe produced under regular manufacturing conditions by the American Rolling Mill Company, Middletown, Ohio. Material and manufacturing process met the requirements of A.S.T.M. Designation A-139 Grade B, covering electric fusion spiral welded pipe. The analysis of the test specimen was certified as follows:

CHEMICAL COMPOSITION

Carbon per cent	.22
Manganese per cent	.45
Phosphorus per cent	.012
Sulphur per cent	.026
Silicon per cent	.08

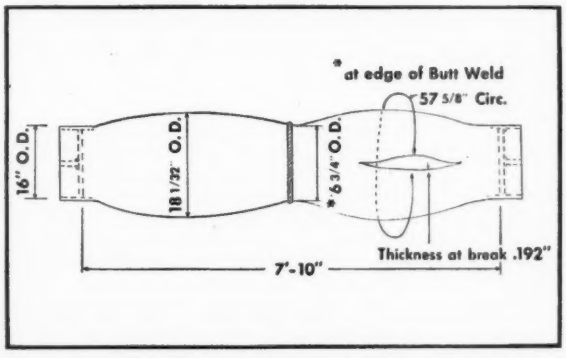
Routine laboratory tests on regular test specimens gave the following:

PHYSICAL PROPERTIES

	Plate	*Weld*
Tensile strength	68200	69000
Yield point	44700	——
Elongation in 2" per cent	34.50	——

Two sections of pipe having pressure heads in one end were butt-welded in order to test both the spiral seam weld and the field joining weld. Pressure for the test was obtained from power pumps. Yield strength pressure was determined by measuring the water input and using .2% volumetric offset after making allowance for water volume in apparatus.

This is one of a series of tests being made by the American Rolling Mill Company to provide authentic technical data to users of ARMCO Spiral Welded Pipe in the oil and gas industry.



Dimensions of spiral welded test specimen after bursting. No leaks occurred prior to bursting. Note that pipe enlarged even at circumferential weld without leaking.

Significant initials

H F are two mighty significant initials to the war time refining industry

They stand for hydrogen fluoride, a remarkable chemical that is multiplying the possible production of 100-octane aviation gasoline

Hydrogen fluoride is the catalyst that economically combines isobutane not only with butylenes, but with propylene and pentylenes too, in the U. O. P. H F alkylation process—reactions long thought to be impossible

Hydrogen fluoride has been known to chemists for three quarters of a century but nobody in the oil industry recognized its importance until—

Universal research men, exploring the field of catalysis, discovered its exceptional power to react olefins with isoparaffins and invented the process to make the operation practical and efficient

Now it's a vital wartime process—more than a score of plants are building to operate the U. O. P. H F alkylation process It's available to all refiners

H F stands for heroic flyers, too—they are the boys who benefit the most from this Universal invention

OIL IS AMMUNITION—USE IT WISELY CARE FOR YOUR CAR FOR YOUR COUNTRY

Universal Oil Products Co
Chicago, Illinois

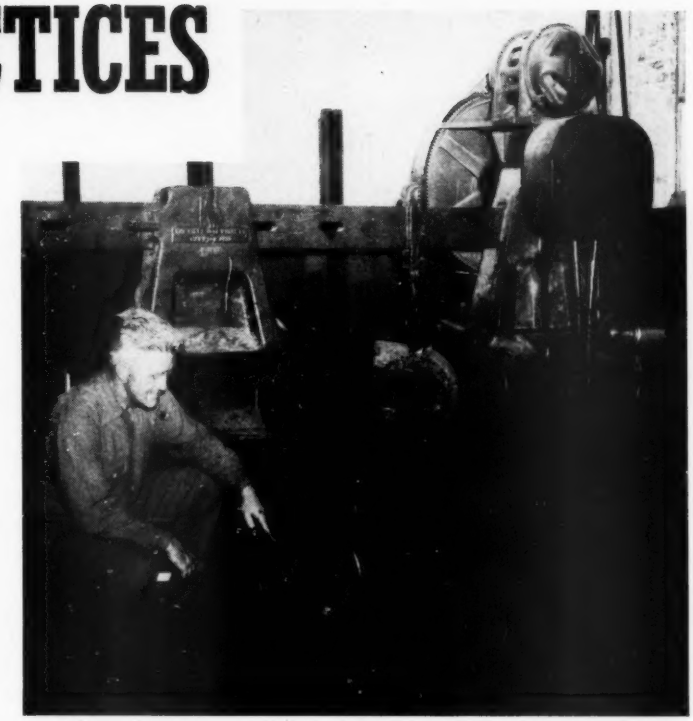
Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

PLANT PRACTICES

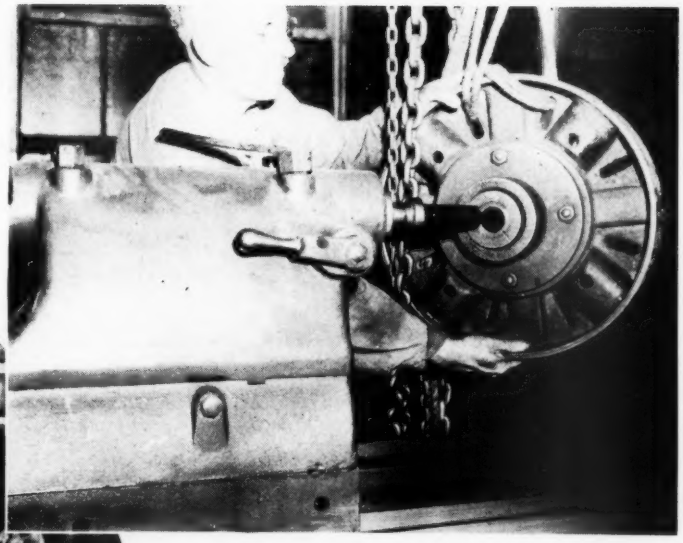
Portable Hydraulic Cylinder

WHEN handling heavy or bulky equipment, such as multistage hot-oil pumps, removing the rotor from the cylinder is quite difficult, frequently due to coke deposition between the fitted parts. The pump assembly is too bulky to place in a regulation hydraulic press; frequently heavy strong backs and draw bolts are made up, and heat is applied to the cylinder, outside. An auxiliary, portable hydraulic jack with 200-ton capacity was made up by G. G. Coombs, machine-shop foreman for Pan American Refining Corp., shown in the illustration. This jack is connected to the hydraulic system of the standard 200-ton wheel press—shown in background—by any required length of pipe and the press pumps supply the power needed. The jack is a heavy cylinder, approximately 14 in. in diameter by 3 ft. long, fitted with a plunger about 9 in. in diameter. Near the cylinder bottom is a hole entering the cylinder and threaded for pipe connection. A heavy oil pump job can be done in 4 hours with three men.



Floor Plate for Holding Equipment

FOR holding heavy valves, shafts and other equipment while working on them in the repair shop, a 3-in. steel plate is bolted into a large concrete block; numerous holes are drilled in the plate, at various diameters, tapped for receiving bolts; angle irons, clamps and other fastening attachments are bolted to this plate, to which may be attached practically any type of equipment.



Tail Chuck for Large Pipe in Lathe

WHEN forced to thread or otherwise machine the largest sizes of pipe, the stock cannot be supported by the regular tail-stock center point. To get around this difficulty, R. W. Louwein, assistant machine-shop foreman for Pan American Refining Co., screwed into a large lathe chuck a heavy cast-iron bushing which was drilled out to admit with a bearing fit a stem approximately 1½ in. in diameter; the opposite end of the stem was tapered to fit into the regular lathe tail stock. With the chuck so mounted the rear end of the large pipe is chucked to maintain the pipe in the horizontal position, tail chuck rotating with pipe.

This "BIG STICK Policy" ups production 140%

Teddy Roosevelt had a good idea in 1901 when he advised, "carry a big stick, and you'll go far."

Yes, by today's arc welding standards that "Big Stick Policy" is still good.

Right! USE THE BIGGEST POSSIBLE STICK OF ELECTRODE, AND YOU'LL GO FAR.

Look what they're doing in this shop. By boosting electrode size, output of tank track sections was increased like this:

Size "Fleetweld" Electrode	Parts Welded Per Hr.
1/8"	10
5/32"	17
3/16"	24

Swell! 3/16" electrode may not be a giant but it got "big stick" results here . . . an output increase of 140%. Some shops are boosting electrode size up to 3/8". It all depends on the nature of your work. You can get "big stick" advice from Lincoln.

THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio

VISCOSIMETRY and New Graphical VISCOSITY CLASSIFICATIONS

by C. M. Larson and W. C. Schwaderer†*

THE major consideration in selecting an oil for a particular application must be given to viscosity and its dependence upon temperature. This viscosity factor, being one of the fundamental properties of lubricating oils, enters into many calculations used in chemical engineering, petroleum research, machine design and industrial and automotive equipment operation.

However, the wide variety of petroleum fluids encountered in practice necessitates a search for viscosity data which are scattered in tables, handbooks, etc.

*Chief consulting engineer, Sinclair Refining Co. †Staff engineer, Sinclair Refining Co.

This article is a complete treatise of everything worthwhile on the subject of viscosimetry and is of great practical interest to the petroleum industry and to all users of lubricants, particularly the armed forces who need this information.

To facilitate the task of making an intelligent selection of oils on a viscosity basis and to eliminate cumbersome computations, interpolations, conversions, and alignment charts, four new viscosity classification charts have been designed to show at a glance the following viscosity data:

1. Viscosity index—A.S.T.M. (D567-41) and corresponding values at 130° F.

2. Kinematic and Saybolt Univer-

CRANKCASE OIL CLASSIFICATION

SAE Recommended Practice
(1943 SAE Handbook)

SAE Viscosity Number	Viscosity Range, Saybolt Univ., Sec.			
	At 130 Deg. Fahr.		At 210 Deg. Fahr.	
	Min.	Max.	Min.	Max.
10	90	Less than 120	...	.....
20	120	" " 185	...	.....
30	185	" " 255	...	.....
40	255	.....	...	Less than 80
50	...	.....	80	" " 105
60	...	.....	105	" " 125
70	...	.....	125	" " 150

The SAE Viscosity Numbers constitute a classification of crankcase lubricating oils in terms of viscosity only. Other factors of oil quality or character are not considered.

In the case of prediluted oils, SAE Viscosity Numbers by which the oils are classified shall be determined by the viscosity of the undiluted oils.

AUTOMOTIVE MANUFACTURERS' VISCOSITY CLASSIFICATION

(1943 SAE Handbook – Italics inserted by Authors)

Viscosity Number	Viscosity Range at 0 Deg. Fahr., Saybolt Univ. Sec.	
	Min.	Max.
10W	5,000	10,000* *(12,000-See Note)*
20W	10,000* *(12,000-See Note)*	40,000* *(48,000-See Note)*

NOTE: The Viscosity limit lines for 10W and 20W shown on the Viscosity Classification Charts are based on the values of 5,000, 12,000 and 48,000 Saybolt Universal Seconds at 0 Deg. Fahr. using the new ASTM Viscosity Temperature Chart (ASTM D341-39)

An oil having an estimated viscosity of 10,000 Saybolt sec. at 0 deg. fahr. when extrapolated on the original chart from viscosities determined at 100 and 210 deg. fahr. may have an estimated viscosity as high as 12,000 Saybolt sec. when the extrapolation is made, in accord with the recommended procedure on the new charts (ASTM, D341-39).

Likewise an oil having an estimated viscosity of 40,000 Saybolt sec. at 0 deg. fahr. when extrapolated on the original chart from viscosities determined at 100 and 210 deg. fahr. may have an estimated viscosity as high as 48,000 Saybolt sec. when the extrapolation is made, in accord with the recommended procedure on the new charts (ASTM, D341-39).

*These increases from 10,000 to 12,000 sec. and from 40,000 to 48,000 sec. are due solely to the fundamental difference between the old and new viscosity temperature charts and do not include differences in reported values due to errors in individual viscosity determinations and errors in extrapolating.

TRANSMISSION AND AXLE LUBRICANT CLASSIFICATION

SAE Recommended Practice
(1943 SAE Handbook)

SAE Viscosity Number	Viscosity Range, Saybolt Universal	Consistency Must Not Channel in Service at Deg. Fahr.
80*	100,000 Sec. at 0 Deg. Fahr., Max.	Minus 20
90	800 to 1500 Sec. at 100 Deg. Fahr.	Zero
140	120 to 200 Sec. at 210 Deg. Fahr.	Plus 35
250†	200 Sec. at 210 Deg. Fahr., Min.	.....

The SAE Viscosity Numbers for transmission and rear-axle lubricants constitute a classification in terms of viscosity and of consistency at low temperatures only. Other factors of quality or character are not considered.

*In the case of SAE No. 80 the minimum viscosity limit is not specified since this grade is special for use at very low temperatures at which SAE No. 90 would be too heavy. The oil company furnishing the lubricant shall be responsible for maintaining a sufficiently high minimum viscosity to provide satisfactory lubrication.

†In a similar manner the maximum viscosity limit for SAE No. 250 is not specified, since this grade is a special one for temperatures at which SAE No. 140 is too light. The oil company furnishing this lubricant shall be responsible for maintaining a sufficiently low maximum viscosity to provide satisfactory shifting of gears without channeling at the lowest temperature for which the lubricant is recommended.

In the case of fluid grease made by adding soap or other thickening ingredients to oil, the viscosity number by which the lubricant is classified shall be determined by the viscosity of the oil before the addition of the soap or other thickening ingredients.

Fig. 1

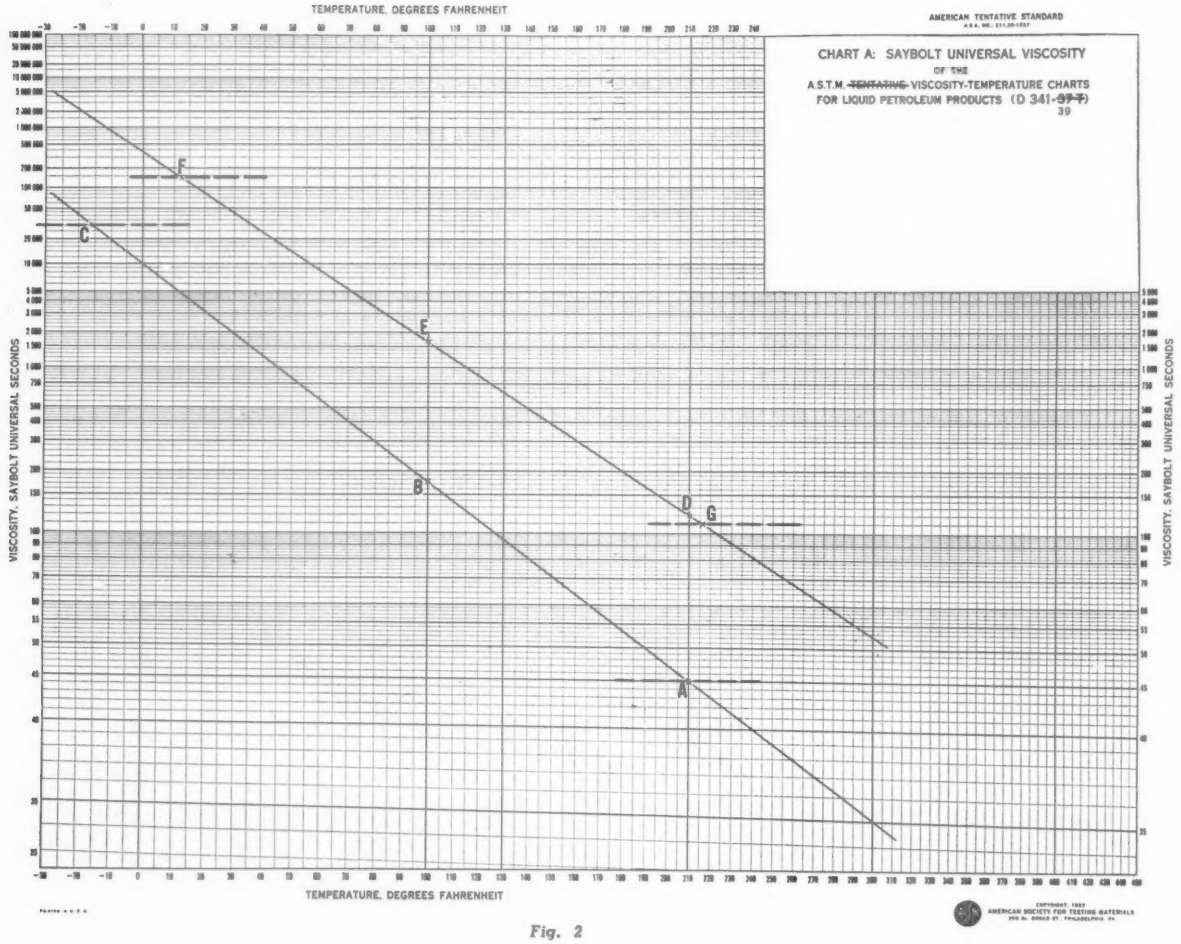


Fig. 2

sal viscosities — conversion scales based on and amplified from A.S.T.M. standard method for conversion of kinematic viscosity to Saybolt Universal viscosity (D446-39).

3. S.A.E. numbers—viscosity crankcase oil classification.

4. Automotive manufacturers' viscosity classification.

5. S.A.E. numbers—viscosity transmission and axle lubricant classification.

6. Viscosity—temperature relationships at 0° F., 100° F., 130° F., and 210° F. for crankcase oils and gear lubricants.

Graphical determinations are more convenient than computations, and for this reason the manufacturer and marketer of lubricants, designer and builder of engines and industrial equipment as well as the consumer, should find it easier to analyze and evaluate viscosity data by simple inspection of these viscosity classification charts. The resulting visualization of the problem on hand will contribute enormously to its solution.

Viscosity index (V.I.). — The V.I. values shown in the four viscosity classification charts are based on the A.S.T.M. approved values.

A.S.T.M. (D567-41).—Quoting from A.S.T.M. Standards D567-41: "Definition—the viscosity index is an empirical number indicating the effect of change of temperature on the viscosity of an oil. A low viscosity index signifies relatively large change of viscosity with temperature."

Viscosity index is calculated as follows:

$$V.I. = \frac{L - H}{L - U} \times 100$$

where

U = viscosity at 100° F. of the oil whose viscosity index is to be calculated,

L = viscosity at 100° F. of an oil of 0 viscosity index having the same viscosity at 210° F. as the oil whose viscosity index is to be calculated, and

H = viscosity at 100° F. of an oil of 100 viscosity index having the viscosity at 210° F. as the oil whose viscosity index is to be calculated.

Values of H and L must be calculated by A.S.T.M. method (D567-41) or obtained from published tables.

At present the V.I. is the sole recognized standard system of evaluating rate of change of viscosity with temperature and has found its way into the government specifications. However, it may be desirable that this index some day be superseded by a more appropriate system which is not merely an empirical index but rather an expression of a property of an oil associated with its true nature and industrial applicability. Perhaps no single petroleum characteristic can fulfill this demand.

Where V.I. breaks down.—Unfortunately the V.I. is not always a clearly defined value and does not obey throughout the linear regularity as we can observe on Chart 4 where, in the domain of the heavy oils with higher viscosity indices the V.I. lines begin to curve downward crossing twice the 100° F. viscosity lines. Such points of intersection belong to two different oils which thus have the same V.I., although they possess equal viscosities only at 100° F. but not at 210° F., which is contrary to the underlying idea of V.I.

Viscosity units.—Viscosity can be measured in absolute units: in stokes (kinematic viscosity) and in poises

Yes, Sir... YELLOW STRAND

PREFORMED ROTARY LINE

was on the job when

J. S. Abercrombie Co.

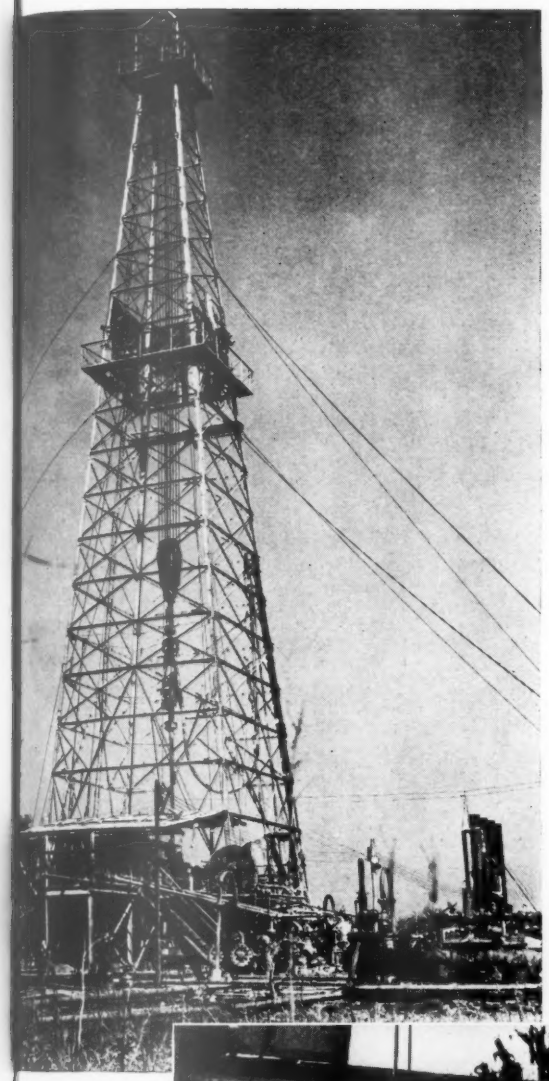
drilled the 1-B McDonald to

14,378 ft.

...a new Texas record and the 3rd deepest well in the world!

In addition to setting a new Texas and Gulf Coast depth record, this celebrated J. S. Abercrombie operation in the Old Ocean field was remarkable for its speed. Credit is rightfully shared by the management, the drilling crews and the equipment. Notable performance among the latter was contributed by four patented Abercrombie fluid piston slush pumps and two 2500-ft. Preformed Yellow Strand IWRC Rotary Lines. The Yellow Strand wire line on the rig when total depth was attained made 44 round trips and itself set a new Abercrombie record for ton-miles. Remember . . . Preformed Yellow Strand also was the choice of Fain Drilling Co. when Continental's Proctor No. 1 reached 14,582 ft. in 1939. That's *two* of the three deepest holes in the world for Preformed Yellow Strand. Need we say more?

BRODERICK & BASCOM ROPE CO., St. Louis
Houston Branch: 1311 Palmer St.



Above, the Abercrombie rig that drilled the new Gulf Coast record for J. S. Abercrombie Co. and Magnolia Petroleum Co.

Above, the rotary table and one of the B & B reels.

Below, these members of the drilling crew have a right to be pleased with the smooth, speedy job they turned in.

At left, the drawworks with Preformed Yellow Strand showing.

THE CONTINENTAL SUPPLY CO.
Mid-Continent Distributors

The REPUBLIC SUPPLY CO. of California
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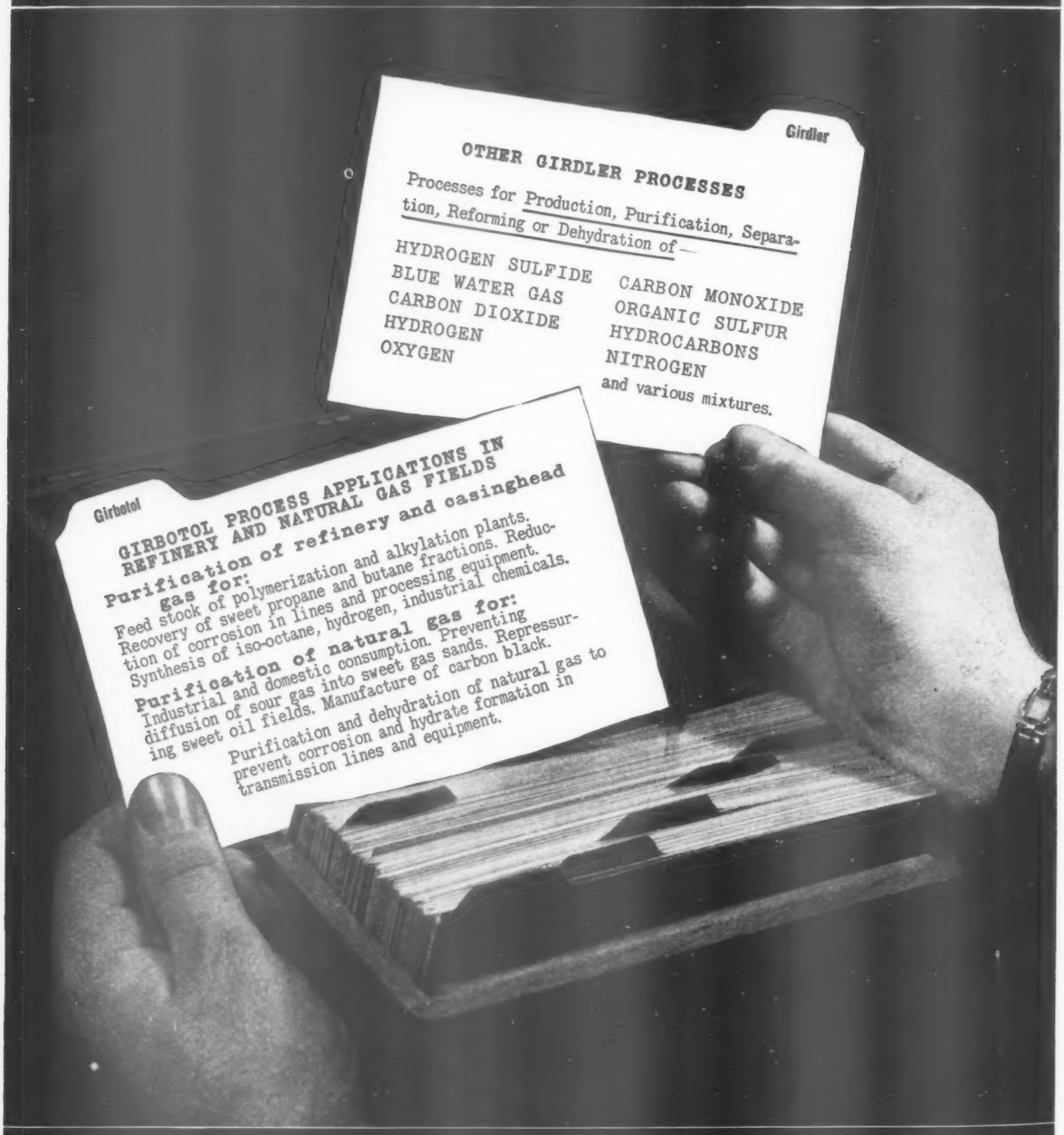
Girdler
OTHER GIRDLER PROCESSES
Processes for Production, Purification, Separation, Reforming or Dehydration of—
HYDROGEN SULFIDE
BLUE WATER GAS
CARBON DIOXIDE
HYDROGEN
OXYGEN
CARBON MONOXIDE
ORGANIC SULFUR
HYDROCARBONS
NITROGEN
and various mixtures.
Girbotol
GIRBOTOL PROCESS APPLICATIONS IN REFINERY AND NATURAL GAS FIELDS
Purification of refinery and casinghead gas for:
Feed stock of polymerization and alkylation plants. Recovery of sweet propane and butane fractions. Reduction of corrosion in lines and processing equipment. Synthesis of iso-octane, hydrogen, industrial chemicals.
Purification of natural gas for:
Industrial and domestic consumption. Preventing diffusion of sour gas into sweet gas sands. Repressuring sweet oil fields. Manufacture of carbon black.
Purification and dehydration of natural gas to prevent corrosion and hydrate formation in transmission lines and equipment.

THE GIRDLER CORPORATION (Gas Processes Div.), Louisville, Ky.

(centimeter-gram-second system); and in conventional units: in Saybolt Universal seconds, in Redwood seconds and in Engler degrees.

The relation between stokes (1 stoke = 100 centistokes) and poises (1 poise = 100 centipoises) is given by the formula:

$$\text{Kinematic viscosity (centistokes)} = \frac{\text{centipoises}}{\text{specific gravity}}$$

(All three factors at the same temperature.)

Conversion scales.—In view of the general trend towards the adoption of absolute and universally accepted units, the kinematic viscosity scales were included in the charts. The values on which these scales are based were taken from the A.S.T.M. conversion tables for kinematic and Saybolt Universal viscosities (D446-39).

Kinematic viscosity vs. Saybolt Universal viscosity.—Saybolt Universal viscosity determinations at best cannot be expected to agree closer than one-fifth second, which for an oil of 37 seconds viscosity at 210° F. is magnified into an error of at least 10 points viscosity index.

This shows how important it is to use a proper viscosimeter which will give directly the absolute viscosity in kinematic units, and it may be noted that the Saybolt viscosimeter has been wholly displaced by the capillary type apparatus (A.S.T.M.—D445-42T) in most research laboratories for lower viscosity oils and to some extent, in routine testing laboratories. The ordinate and abscissa on Chart 1 are based on kinematic viscosity units but Saybolt Universal viscosity scales are also included.

What are the practical V.I. limits?—The four charts show V.I. curves separated by five V.I. units, while the intermediate V.I. units can be determined to the accuracy of one unit by mental interpolation. The question arises whether an accuracy of two to three V.I. units can actually be reached in measuring the viscosity indices under routine laboratory conditions of viscosity determinations, and whether a difference of one, two, or, say five units is of importance or otherwise significant; and what limits should be specified?

One writer argues that "the V.I. scale has introduced a complacency with regard to viscosity-temperature characteristics which has had the effect of discouraging further scientific investigation of the means of assessing such qualities as inherent film strength, and the synthesis of more satisfactory lubricants." He further contends that "this superprecision of V.I. seems to be rather like taking surgical instruments to chop up firewood."

It has also been suggested to measure V.I. on a scale of 10 instead of on a scale of 100 units, which would be equivalent to establishing 10 zones of V.I. with some additional zones to take care of the V.I. units above 100.

Proposed V.I. limits.—Considering all factors involved, including errors in measurements of viscosity at the two required temperatures and the practical application of the lubricants, the authors propose that V.I. should always be stated to the nearest unit division of 5, which would give a sufficient accuracy of $\pm 2\frac{1}{2}$ units to any specified V.I. number. Such ratings will be found to be well within commercial tolerances and will be close enough for commercial bidding purposes.

Additives.—The influence of additives on viscosity and thereby on V.I. has not been sufficiently investigated but the so-called "V.I. improvers" often create what may be called a "false viscosity." It is doubtful whether the high V.I. thus obtained reflects the true rating of the oil, especially under high rates of shear. In fact, certain types of internal-combustion engines may be better served by the use of oils of lower V.I., possibly modified by the addition of inhibiting agents preventing oxidation and corrosion.

S.A.E. viscosity numbers and automotive manufacturers' viscosity classifications.—In Fig. 1 all S.A.E. and automotive manufacturers' classifications are listed together with important notes. These viscosity values are shown in the viscosity classification

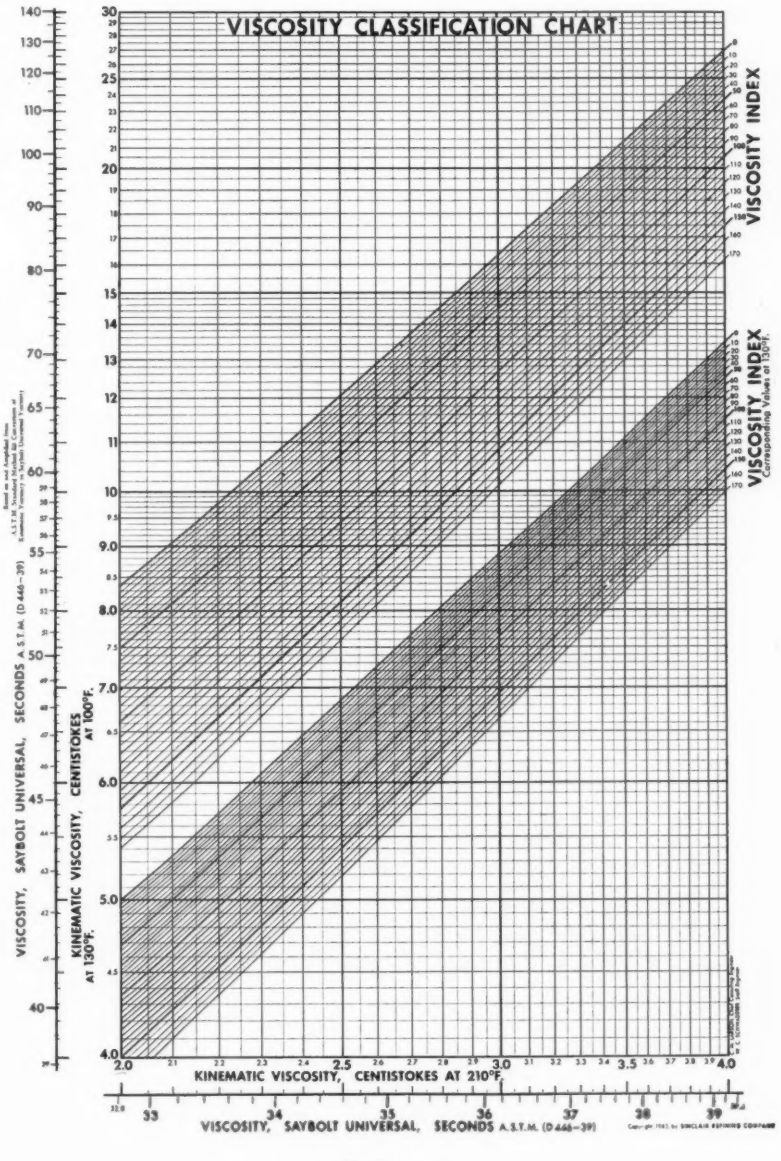
VISCOSITY CLASSIFICATION CHART
VISCOSITY INDEX
VISCOSITY INDEX
Corresponding Values at 130°F.
VISCOSITY, SAYBOLT UNIVERSAL, SECONDS A.S.T.M. (D 446-39)
KINEMATIC VISCOSITY, CENTISTOKES AT 130°F.
KINEMATIC VISCOSITY, CENTISTOKES AT 210°F.
VISCOSITY, SAYBOLT UNIVERSAL, SECONDS A.S.T.M. (D 446-39)

Chart 1

charts by red lines marking the viscosity and temperature limits of each particular S.A.E. viscosity number.

A.S.T.M. viscosity - temperature charts for liquid petroleum products (D-341-39).—The variation of viscosity of petroleum oils with temperature may be determined with considerable accuracy when the viscosities at any two temperatures are known. Special A.S.T.M. charts are published for that purpose, covering both Saybolt Universal viscosity and kinematic viscosity. If the two known points such as A and B also D and E (Fig. 2) are plotted on the chart and are joined by an extended straight line, viscosities at any other temperature can be read from that line. These lines are called temperature-viscosity curves.

Viscosity requirements in practice.—Cold starting of automotive engines is retarded by high viscosity, and, if the viscosity of the crankcase oil is greater than 30,000 seconds Saybolt Universal (see Fig. 2, point C) the cranking speed is so slow that firing of the gases does not occur. This is also true for aircraft engines where 145,000 seconds is the accepted value for some makes (see Fig. 2, point F). These low temperature limits for oils can be found by the plots indicated.

Operating temperatures of bearings and equipment lubricated with straight mineral oils have minimum viscosities, allowable for safety, as follows:

Lubricants applied to—	Minimum viscosity, in Saybolt Universal seconds at operating temperatures
Well-designed high-speed bearings (turbines)	40
Automobile bearings (circulating oil)	45
Heavy-duty automotive engines (circulating oil)	70
Aircraft engines (circulating oil)	110
Readuction gears and speed reducers	200-500
Transmission and rear axle gears	400-1,000
Exposed gears	10,000-30,000

Knowing the temperature of operation and the type of machines and service the viscosity limits can likewise be checked by the viscosity-temperature plots for the high-temperature limits for oils (see Fig. 2, point A at 45 seconds, Saybolt Universal, referring to automobile bearings and point G at 110 seconds referring to aircraft engines).

Selection of lubricants. — Since, from now on, we are able to visualize all possible viscosity specifications by inspecting the viscosity classification charts and easily to divide the oils into groups, we may effect a simplification of grades of lubricants to the benefit of both users and refiners. There are some applications of the oils in which viscosity may be critical, but in most cases there is a wider margin than is generally supposed to be the case.

It has been pointed out that at the increase of an ordinary room temperature by 1° F., the drop in viscosity of even the best oils is about 3 per cent, and unless the machinery to be lubricated is inclosed in a constant temperature jacket, the "super-selection" of the oil grades should be made with the greatest care.

Decreasing the multiplicity of grades.—From the viewpoint of the designer and engine builder, a suitable viscosity classification is desirable because it will enable the designer to specify more readily, in absolute units, the general type of oil required for the lubrication of his machine. The refiner and marketer of lubricants would benefit alike by a well-designed classification system which would make it easier both for the customer and designer to understand their respective needs and demands.

A tendency of an individual operator to call for oils specifically designed for particular types of machinery for which special oils are, or may be required, will be decreased. At least a decidedly lesser number of brands for the marketer and a wider use of those actually required would

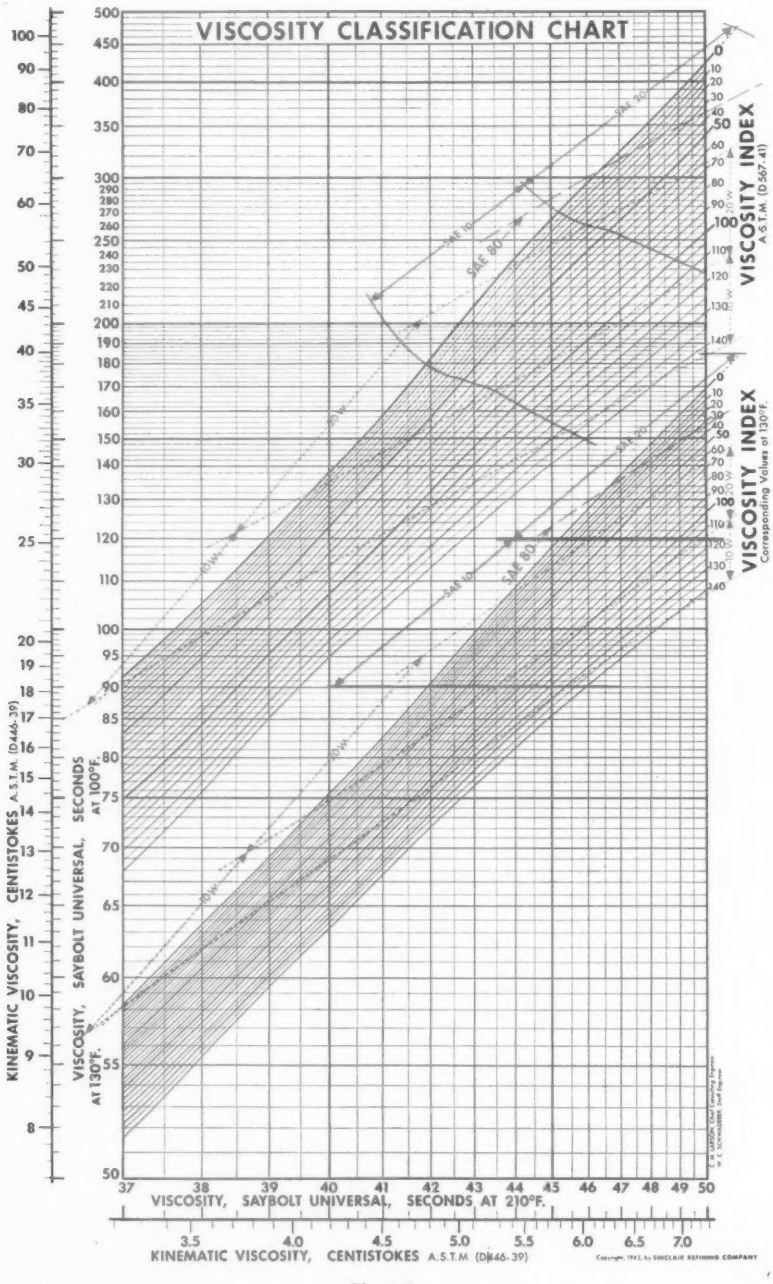

Chart 2

result from such a simplification. A well-designed classification system would tend towards uniformity in the viscosity ranges of oils used for different services.

Rationalization of the system.—Any system of classification must be:

1. Simple and readily interpretable;
2. Generally adopted by everyone concerned, including the various engineering societies;
3. Able to fit the viscosity requirements for all types of equipment and temperature ranges;
4. Expandable or flexible enough to take care of changes in design of machinery and in conditions of operation; and
5. Based on absolute viscosity units internationally accepted.

Multipurpose lubricants.—The adoption of such an appropriately rationalized standard classification will lead from the multiplicity of oil grades to the "Multipurpose Lubricants."

Viscosity Classification Charts

Viscosity at 100° F., 130° F., and 210° F.—On the four new charts the vertical axis at the left indicates the Saybolt Universal viscosity at 100° F. and 130° F. in seconds. The horizontal axis at the bottom covers the Saybolt Universal viscosity at 210° F. (ranging from 32.8 to 350 seconds).

Conversion scales. — Outer left and bottom kinematic viscosity scales in centistokes serve the purpose of rapid viscosity conversions. Note: Chart 1 shows the Saybolt and kinematic viscosity scales in reversed order.

Viscosity index (V.I.) lines.—The sloping lines indicate the V.I. values in units of 5, while the intermediate V.I. units can be determined to the accuracy of one unit by mental interpolation. The right-hand upper scale gives the V.I. indices from 0 to 140, while the lower scale shows the corresponding V.I. values at 130° F. (on Chart 1, both scales range from 0 to 170 V.I.).

S.A.E. viscosity numbers and Automotive Manufacturers' viscosity classifications.—The lower and upper viscosity limit for the various classifications are indicated in the charts as follows:

S.A.E. motor oils—red solid lines.

S.A.E. gear oils—red dashed lines. The red dashed line for S.A.E. 80 marks the upper viscosity limit at 100° F. and 130° F., for all gear lubricants, which have a maximum viscosity of 100,000 Saybolt Universal seconds at 0° F. (see Fig. 1).

10W and 20W—red thin dotted lines, which mark the lower and upper viscosity limits at 100° F. and 130° F. for all oils, which have minimum and maximum 0° F. viscosities of 5,000, 12,000 and 48,000 Saybolt Universal seconds, as explained in Fig. 1.

Inserted red numbers and arrows show the limits of these classifications.

Examples

How to Use the Charts

Example 1.—Given: Saybolt Universal viscosity of an oil, at 100° F. = 510 seconds; at 210° F. = 62.5 seconds.

Required: (a) Graphical determination of viscosity index (V.I.) = ?

(b) S.A.E. number classification = ?

(c) Can this oil be classified as 20W = ?

(d) Saybolt Universal viscosity at 130° F. = ?

(e) Kinematic viscosity of this oil at 100° F. = ?

(f) Kinematic viscosity of this oil at 210° F. = ?

Solution: Use Chart 3. (a) Locate the two given viscosities on their respective viscosity scales. The 510 seconds point is located on the left viscosity scale of 100° F. Saybolt Universal (approximately halfway between 500 and 520), and the 62.5 seconds point on the bottom viscosity scale of 210° F. Saybolt Universal (approximately halfway between 62 and 63). Project this 62.5 point ver-

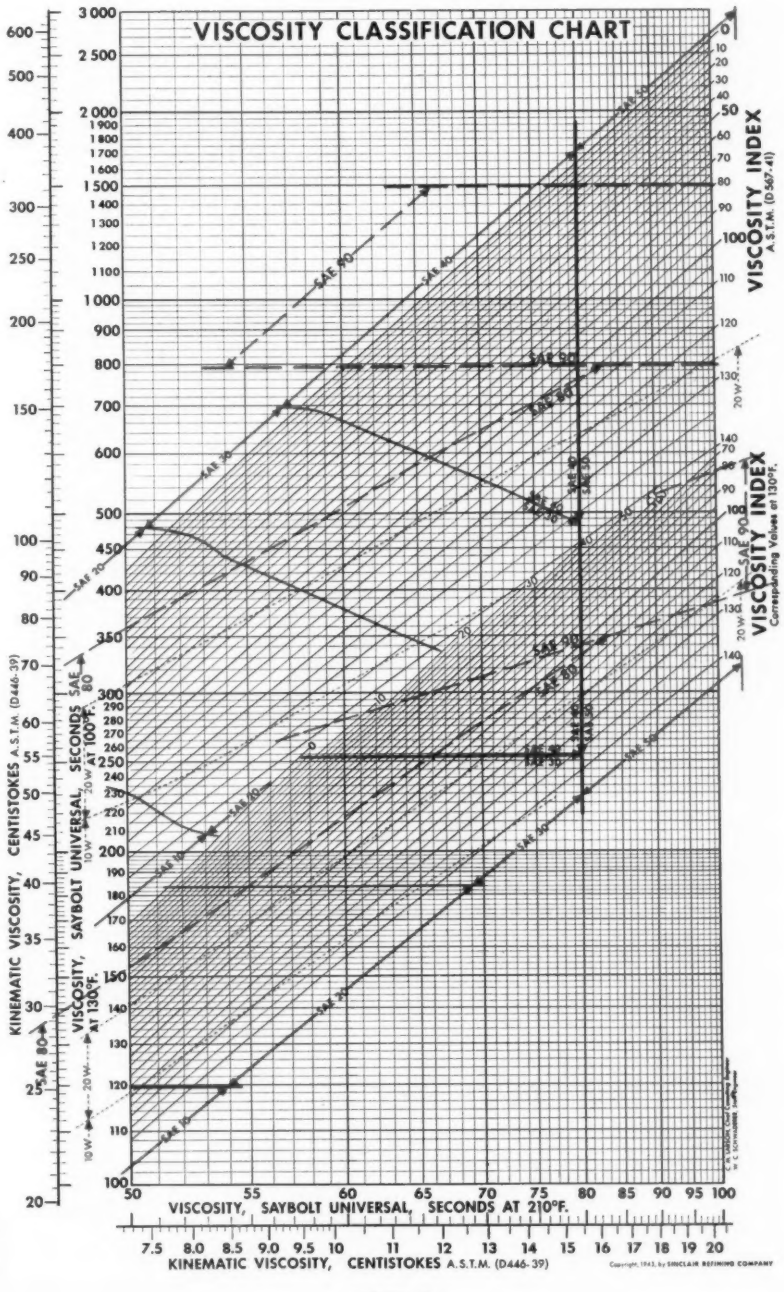

Chart 3

tically upward until it meets the horizontal projection from left to right of the located 510 point.

Either mark this point or let your pencil point rest there. Read the index of the upward sloping line passing through the obtained point on the right-hand upper viscosity index scale (a transparent straightedge is very convenient for this purpose). This index will be the requested V.I.

Thus it will be found that the oil in question has the V.I. of 90. (This value is reasonably close to the value of 90.1 which is obtained by direct calculation following the procedure prescribed in A.S.T.M. Method D567-41).

(b) The 510-62.5 intersection point is located between the red limit lines for S.A.E. 30 and below the red dashed upper limit line for S.A.E. 80. The oil in question can, therefore, be classified as a S.A.E. 30 motor oil and a S.A.E. 80 gear oil.

(c) Again, this 510-62.5 intersection point is just above the red dotted upper limit line for 20W oils, which means the viscosity of the oil at 0° F. is greater than 48,000 seconds.

Therefore the oil in question cannot be classified as a 20W oil.

(d) From the 510-62.5 intersection point on the V.I. 90 line, run down vertically until the sloping V.I. 90 line of the lower 130° F. V.I. scale is reached. Then go horizontally to the left Saybolt Universal viscosity scale, which reads 225.

Therefore, the Saybolt Universal viscosity at 130° F. of the oil in question is 225 seconds.

(e) On left kinematic viscosity conversion scale, we find 510 seconds Saybolt Universal viscosity of the oil in question at 100° F. = 110 centistokes (but by A.S.T.M. D446 method = 110.4 centistokes.

(f) On bottom kinematic viscosity conversion scale, we find 62.5 seconds Saybolt Universal viscosity of the oil in question at 210° F. = 10.9 (plus) centistokes (but by A.S.T.M. D446 method = 10.93 centistokes).

Example 2.—Given: Saybolt Universal viscosity at 130° F. = 285; V.I. = 120.

Required: (a) S.A.E. classification numbers = ?

(b) Saybolt Universal viscosity at 210° F. = ?

(c) Saybolt Universal viscosity at 100° F. = ?

Solution: Use Chart 3. (a) Go from 285 seconds point on left Saybolt Universal viscosity scale horizontally to the right until the sloping V.I. 120 line is reached on the lower V.I. scale (corresponding values at 130° F.).

This 285-120 intersection point lies below the red dotted upper limit line for 20W and below the red dashed upper limit line for S.A.E. 80, and also between the red limit lines for S.A.E. 40.

Therefore the oil in question can be classified as a 20W and S.A.E. 40 motor oil; and as a S.A.E. 80 gear oil.

(b) From the 285-120 intersecting point, just found, run down vertically and read on the 210° F. Saybolt Universal viscosity scale the value of 78.

Therefore, the Saybolt Universal viscosity at 210° F. of the oil in question is 78 seconds.

(c) Run vertically upward on this 78 seconds line until the upper sloping V.I. 120 line (values at 100° F.) is reached. From this 78-120 intersection point go horizontally to the left and read on the 100° F. Saybolt Universal scale the value of 600 (just below it).

Therefore, the Saybolt Universal viscosity at 100° F. of the oil in question is 600 seconds.

(By the A.S.T.M. D567-41 method: An oil with a 120 V.I. and a 78 sec-

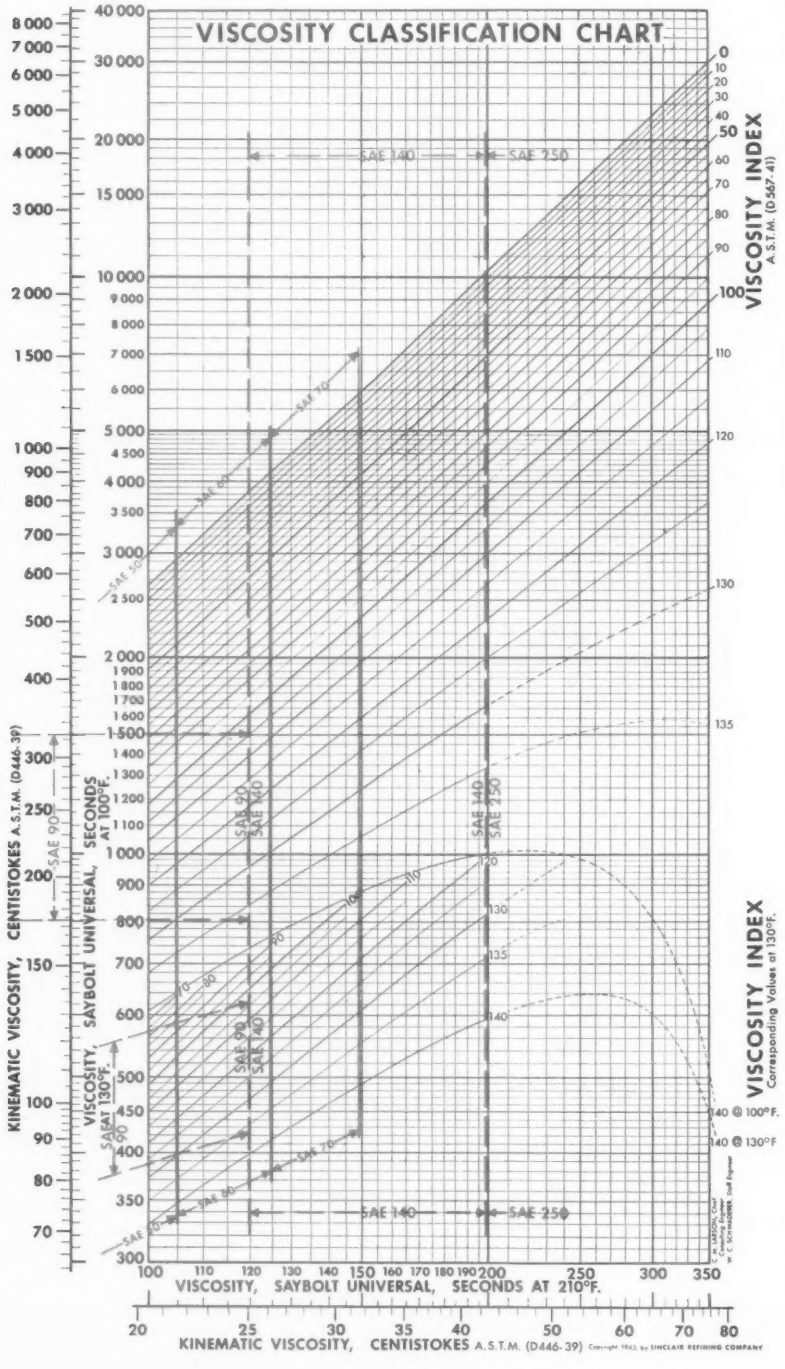

Chart 4

onds Saybolt Universal viscosity at 210° F. has a 100° F. viscosity of 597 seconds, but since the viscosities at 100° F. and 210° F. are **not** given above, this example cannot be solved by the A.S.T.M. method.)

Viscosity Blending and Dilution Chart for Fuels and Lubricants

This new chart furnishes a more convenient means for estimating, in a very simple way, the approximate viscosity of a mixture of petroleum liquids when the viscosities of the components, at one and the temperature, are known.

How to use the chart.—Plot the lower viscosity component on the left viscosity scale and the higher viscosity component on the right viscosity scale. Then draw a straight line through the obtained points. In this way, each point on the line gives the viscosity of the blended product, at the given temperature, depending on the proportion of the components in the blend. These proportions are to be read on the top and bottom percentage scales, respectively.

Distillate, kerosene, gasoline.—In case one of the components in distillate, kerosene or gasoline use the corresponding point so marked on the left viscosity scale. It should be noted, however, that the gasoline viscosity point is to be used only for the mixtures at 100° F., because at other temperatures, the gasoline point will lie either above or below the point indicated on the chart. Thus, at 32° F. the gasoline point will be located at approximately 29.75 Saybolt seconds.

Dilution.—If the viscosities of the original and the used motor oils are known, the approximate percentage of the diluent can be found in accordance with Examples 2 and 3.

Predilution.—See Example 4.

Examples

Example 1.—Given: Viscosity of two oils. Neutral oil, Saybolt Universal viscosity at 100° F. = 200 seconds. Long residuum oil, Saybolt Universal viscosity at 100° F. = 1,950 seconds.

Required: Composition of a mixture to be obtained, whose viscosity should be 300 seconds, Saybolt Universal at 100° F. = ?

Solution: Use Chart 5. Mark on left scale the point 200 seconds and on the right scale the point 1,950 seconds. Join these two points by a straight line with the aid of a straightedge. If we go from the required 300 second point on the left scale to the right until we reach the obtained sloping line and then upwards, we shall find that 21.5 per cent of the high viscosity oil (long residuum) should be blended with 78.5 per cent of low viscosity oil (neutral) in order to obtain an oil of 300 seconds viscosity at 100° F.

Example 2.—Given: Universal Saybolt viscosities of diesel lubricating oil and "used oil." New diesel lubricating oil = 850 seconds at 100° F. Used oil = 570 seconds at 100° F.

Required: Percentage of dilution = ?

Solution: Use Chart 5. Connect the point marked "distillate" (diesel fuel) on the left scale with the 850 seconds viscosity point on the right scale. Then find the intersection point of 570 seconds (used oil) with the obtained sloping line and read on the lower percentage scale (low viscosity product) the required value for the diluent. In this case it is equal to 5 per cent.

Example 3.—Given: Saybolt Universal viscosity of motor oil and used oil (from gasoline engine). Motor oil = 850 seconds at 100° F. Used oil = 540 seconds at 100° F.

Required: Percentage of dilution = ?

Solution: Use Chart 5. Connect the point marked "kerosene" on left scale with the 850 seconds point on right scale. Then find the intersection point of 540 seconds (used oil) with the obtained sloping line and read on lower percentage scale (low viscosity product) the required value for the diluent. In this case it is equal to 5 per cent.

Note: The reason that the point for "kerosene" is taken and not the point of "gasoline" (fuel used) lies in the fact that the lighter ends of the "gasoline" have been distilled off during operation and the viscosity of the heavier ends (diluent) in used oil approximates the viscosity of "kerosene."

Example 4.—Given: 181 seconds, Saybolt Universal viscosity at 100° F., S.A.E. 10 motor oil.

(Continued on Page 79)

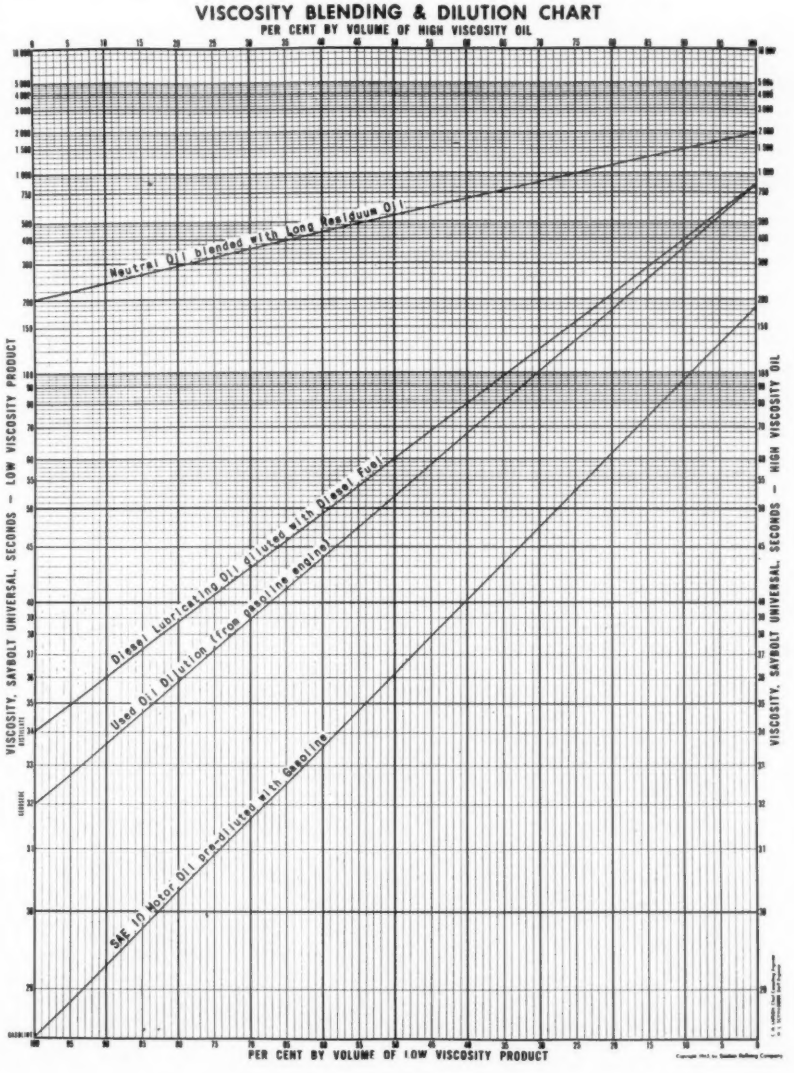
VISCOSITY BLENDING & DILUTION CHART
PER CENT BY VOLUME OF HIGH VISCOSITY OIL
Neutral Oil blended with Long Residuum Oil
Diesel Lubricating Oil diluted with Diesel Fuel
Used Oil Dilution from gasoline engine
SAE 10 Motor Oil pre-diluted with Gasoline
VISCOSITY, SAYBOLT UNIVERSAL, SECONDS — LOW VISCOSITY PRODUCT
VISCOSITY, SAYBOLT UNIVERSAL, SECONDS — HIGH VISCOSITY OIL
PER CENT BY VOLUME OF LOW VISCOSITY PRODUCT

Chart 5

An Experiment in the

Operation of Improvised Compressor Units*

by Frederick Squires†

Wartime restrictions on the manufacture of equipment has created much interest in the problem of fabricating satisfactory substitutes. Experiments performed by the Illinois State Geological Survey have shown the efficiency of the automobile engine as a compressor for air or gas injection.

IN the war-time dilemma caused by the demand for more oil in spite of less steel equipment, there appears one fortunate coincidence. Although oil-field engines and compressors may no longer be obtained except with well-nigh prohibitive difficulty, yet because irreplaceable tires are wearing out, automobile engines are becoming increasingly available. It is the purpose of this paper to show how they may be used for power units and compressors with which to increase oil production.

In reply to the requests of conservation authorities that gas be returned to the oil-producing strata in order to increase oil production and to prevent waste of fuel and reservoir energy, the answer in many cases has been that machinery to do this is not available. The use of the automobile engine may in part refute this contention.

Many years ago in the Buck Run field in southeastern Ohio, when the art of secondary recovery of oil was in its infancy, Arthur Smith of Malta, Ohio, repressured his Cow Run sand leases by means of a Ford engine for power and a converted Ford engine for a compressor.

Gordon Smith & Co. of Bowling Green, Ky., make a combined engine and compressor out of a Model A or B Ford engine, of which the end cylinders are used for power in the usual way and the other two cylinders are converted into compressors by sealing down the Ford valves and providing a new head with valves in the head. The unit is portable and is used for air hammers, sprays, and the like. In a few instances it has been used in the oil fields as a vacuum pump.

In Illinois there is a gas shortage on many of the old leases. At first, single-cylinder oil-field engines were used for power until there was no longer gas enough for fuel to run them, at which time oil engines were

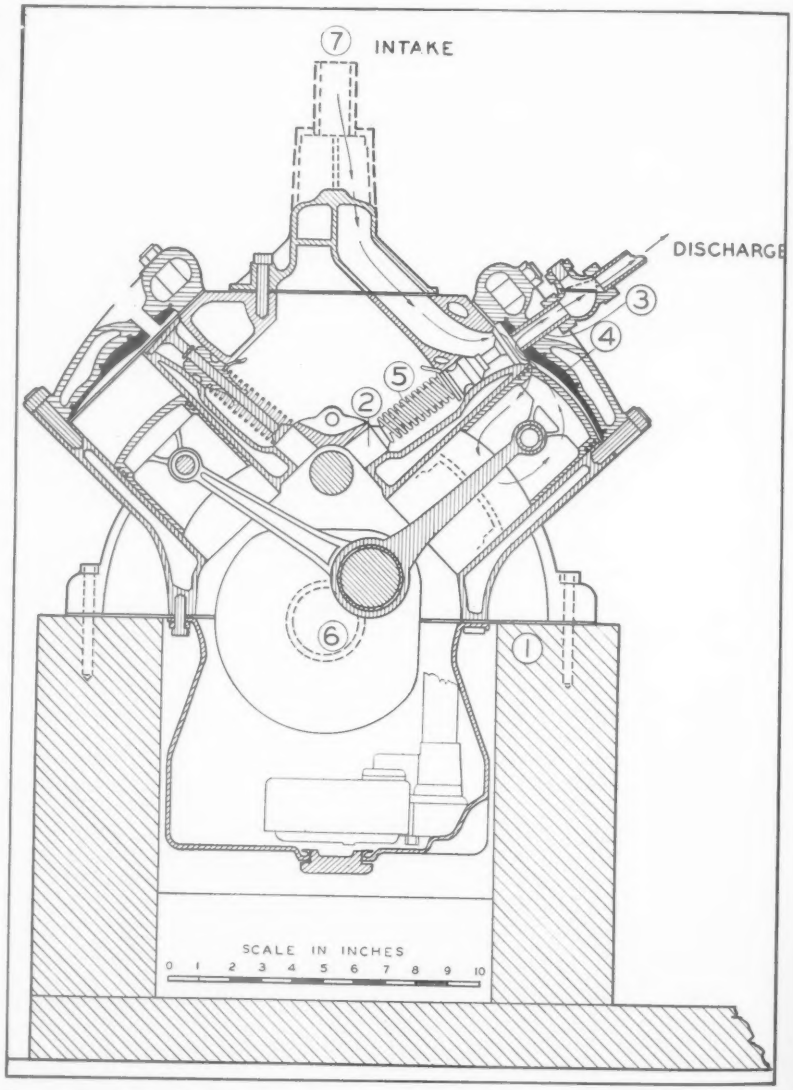

Fig. 1—Section through compressor. Section taken through cylinders farthest from radiator. This shows: (1) Part of engine pan removed. (2) Place from which push rods have been removed. (3) Spark-plug opening reamed out and threaded for ¾-in. pipe. (4) Head drilled for keys and babbitted to reduce dunnage between top of piston and head. (5) A light spring is substituted here for the original heavy spring on the intake valve. (6) Stub shaft is bolted to end of engine shaft on the center. (7) A reduced ¾-in. pipe with valve connects with both openings in the intake manifold. The course of the air or gas is shown by the arrows, entering at 7 and discharging at 3

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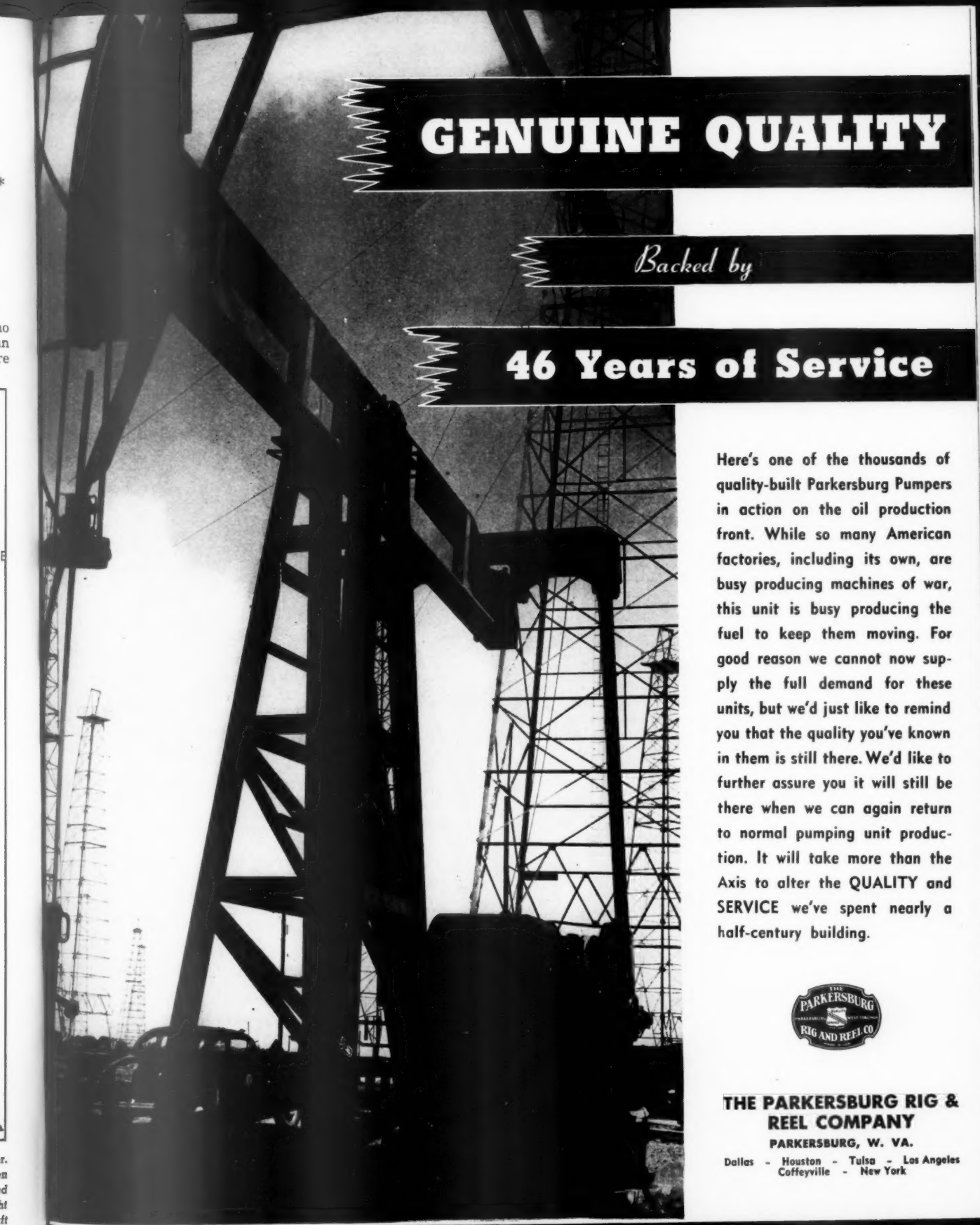
†Petroleum engineer, Illinois State Geological Survey.



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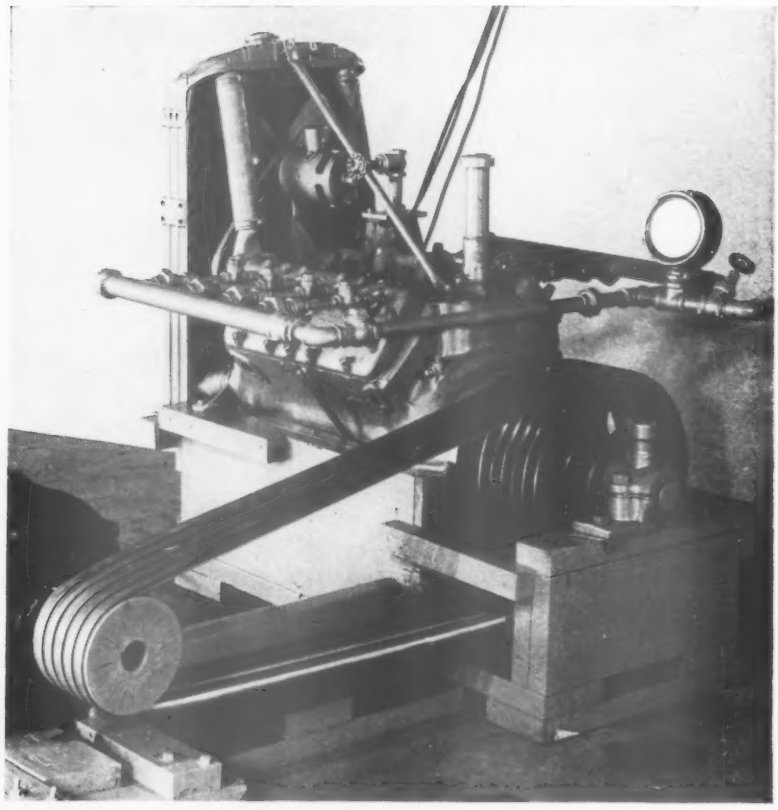


Fig. 2—Photograph of converted compressor. The intake valve may be seen over the regular engine intake manifold and the discharge valve to the right of the pressure gage. Any power available in the oil field may replace the motor here used. It will be noted that the oiling and cooling systems are unchanged from the original engine systems. The principal change shown is the system of discharge check valves which replace the engine cam-operated discharge valves

substituted. The Dinsmoor Oil Co. has replaced many of these oil engines with Buick automobile engines and has found that these engines are so economical in gas consumption that there is no fuel difficulty even with less gas than would run the original gas engine. It is of course obvious that automobile engines can be used for power in any oil field, which is especially important now that standard oil-field engines can no longer be obtained.

The Compressor

The engines most easily converted to compressors are those made for quantity-production low-priced cars, because they are easiest to obtain and their operation is most generally understood. The engines with cylinders in line are the simplest but the Ford V-8 has many advantages which recommend it.

Time did not permit making tests on each of the many available makes of engines, so this article is written in the hope that the general scheme of conversion will appeal to operators needing compressors to the extent that they will work out the scheme on other makes of engines and that progress will be more rapid and general from this multiplication of effort.

Conversion Changes

The Geological Survey undertook to convert a Ford V-8 engine into a compressor, and the following is a description of the method and result.

A rebuilt, second-hand engine was purchased from a local dealer. This was complete as shown in the photograph, Fig. 2, except for the electric motor, pulleys, shaft, bearings, and belts. Since the operation of the compressor does not depend upon the kind of power by which it is driven, there is no discussion of the electric-power unit shown. Any power available in the oil field can be used. In the case in point, a stub shaft was bolted on to the end of the engine shaft (see Fig. 1, No. 6), taking the place of the clutch. On it was placed a 15-in. V-belted pulley, and the outer end of the shaft was carried by an ordinary babbitt bearing. The front end of the engine pan was cut away (Fig. 1, No. 1) in order to allow the engine block to rest directly on the frame. A frame of plank was made and the engine set on it and held down by lag screws at each end as shown in Fig. 1. The following changes were made in the engine so that it would operate as a two-cycle compressor with the valves actuated not by cam-shaft eccentrics but by differential pressure:

All the push rods were removed as shown in Fig. 1, No. 2. The spark-plug openings in the head were reamed out and tapped for ¾-in. pipe, as shown in Fig. 1, No. 3. Into these openings were screwed all-thread nipples connected to 45° angle check valves. The heads were drilled for keys and then babbitted in order to reduce the dunnage between the pistons and the heads. (Spaces above the intake valves were left for free operation. See Fig. 1, No. 4.)

The original strong discharge valve springs were left so as to keep the valves shut at all times, eliminating them from any part in the operation. Very light springs were substituted for the original strong intake springs so that the intake valves would be actuated by the vacuum formed by the downstroke of the piston. This is shown on Fig. 1, No. 5.

Intake Manifold

The intake manifold serves the right and left bank of cylinders separately. These two are brought together (Fig. 1, No. 7) into a single pipe on which is a valve to regulate the amount of air or gas to be drawn in and compressed.

The oiling and cooling systems were unchanged from those on the original engine.

The operation of the compressor is illustrated by the arrowed line running from 7 to 3 (Fig. 1) in the following cycle. As the piston goes down, the vacuum that is created closes the discharge valve, opens the intake valve, and air thus fills the cylinder. The upstroke of the piston closes the intake valve, opens the exhaust valve, and discharges the contents of the cylinder through the discharge valve. This is the whole story. The completed compressor is shown in the photograph (Fig. 2).

This compressor was run at 900 r.p.m. and delivered at the rate of 105,000 cu. ft. per day, as measured by Pitot tube, against atmosphere. It would require a 15-hp. engine as the motor showed a load of about 12 hp. at 120 lb. per sq. in. pressure.

The cost of the compressor, exclusive of motor, pulleys, shaft and belts, amounted to less than $250. Its fabrication is subject to no priorities except that a used block must be delivered to the Ford agency, which exchanges for it a completely rebuilt motor. The double feature of the intake manifold allows one bank of

(Continued on Page 79)

Oil-Well Pumping Practices—No. 3

Sucker-Rod Pumping System

by J. Zaba

The first two articles of this series, which began in the issue of July 1, dealt with the basic principles of reservoir behavior. In this and the succeeding installment, the abstract concept of a pumping system is discussed in order to create a foundation for the discussion of the component parts of the mechanism and of the installation of a unit. Next week's article will discuss the measurement of the forces involved.

ALL the methods of oil-well pumping can be divided into two main groups: (1) those in which the pumping motion of the subsurface pumping equipment originates at the surface and is transmitted to the pump by means of a string of steel rods, (2) those in which the pumping motion of the subsurface pump originates subsurface in a unit which is supplied with necessary power from the surface. Of these two groups the first, the so-called sucker-rod pumping system is, at present, the one more widely used.

A sucker-rod pumping assembly consists essentially of five parts: (1) the prime mover, furnishing the necessary power, (2) the power-transmission unit, (3) the surface pumping equipment which changes the rotating motion of the prime mover into the oscillating linear pumping motion, (4) the string of steel sucker rods which transmits the surface pumping motion and power to the subsurface pump and the string of tubing within which the sucker rods operate and which conducts the pumped fluid from the pump to the surface, and (5) the subsurface sucker-rod pump.

Depending on the location of the prime mover a sucker-rod pumping installation may be: (1) a unit installation in which the prime mover is located at the well and supplies power to this one well only, or (2) a multiple installation in which one prime mover supplies power to two or more pumping wells. This type of pumping installation may operate as a central pumping power or as a back-crank pumping arrangement.

The actions and behavior of the above mentioned five parts of a sucker-rod pumping assembly are closely interrelated and any calculations leading toward design of a pumping installation must consider the whole pumping mechanism as a unit. While such a procedure is possible and necessary once the needed formulae are understood and agreed upon, it certainly cannot be followed when a review, discussion and explanation of the principles underlying and governing the behavior of a pumping installation is intended. On the other hand any attempt to arrange a logical sequence of discussion of different parts of the mechanism would be difficult, because of the abovementioned interrelation of action of the different parts. For instance if the sucker-rod pump would be selected as a starting point of such a discussion continuous reference would be necessary to the behavior of sucker rods in order to explain satisfactorily the action of the pump. This would definitely lead to confusion. It seems therefore that in order to preserve the continuity of thought of discussion it is first necessary to introduce an abstract concept of a pumping mechanism in which all the mechanical details are disregarded and only forces, motion, loads and measurement of loads are taken into consideration. A brief and general discussion of such a concept would create a foundation for better understanding of later analysis of the component parts of the mechanism, when details of their mechanical features and of their behavior would be given. Such an analysis would be followed by a treatment of installation as a unit presenting data necessary for calculation of loads, power requirements design and efficiencies.

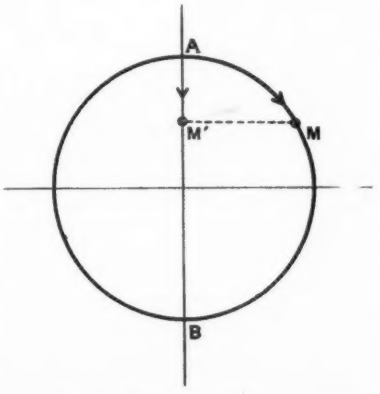


Fig. 1—Simple harmonic motion

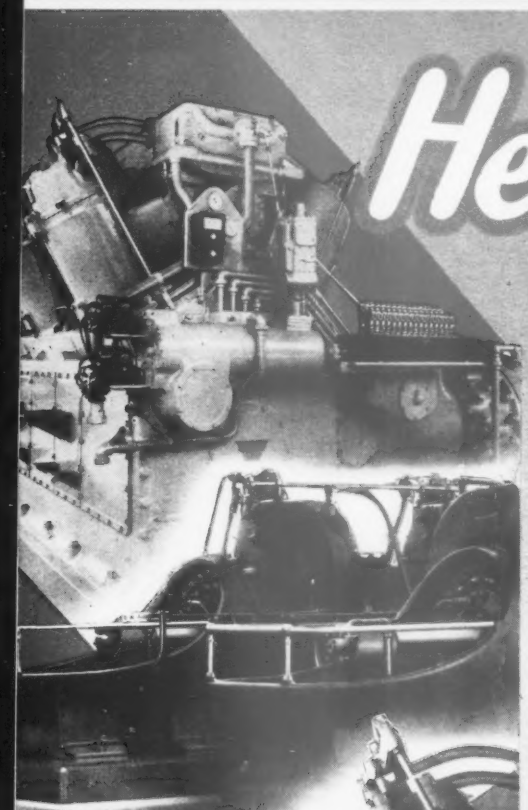
Pumping Loads and Motion

Pumping Motion.—When point M (Fig. 1) is rotating with a constant angular velocity, along the circumference of a circle with diameter A-B. then the movement of the projection M′ of point M on the diameter A-B is described as simple harmonic motion. Simple harmonic motion is a rectilinear, vibratory motion with acceleration proportional and opposite in sign to displacement. Displacement is change of position in relation to a fixed, chosen point of reference.

Motion imparted to the polished rod by a conventional pumping-beam assembly is generally referred to as approximately simple harmonic motion. For several reasons, one of which is the fact that the angular velocity of the crank is seldom if ever constant, the motion is not a true simple harmonic motion. With the length of the pumping stroke small, compared to the length of the walking beam, and with nearly constant rotational speed of the crank, the approximation is close and only a small error results if for practical purposes the polished-rod motion is assumed as simple harmonic.

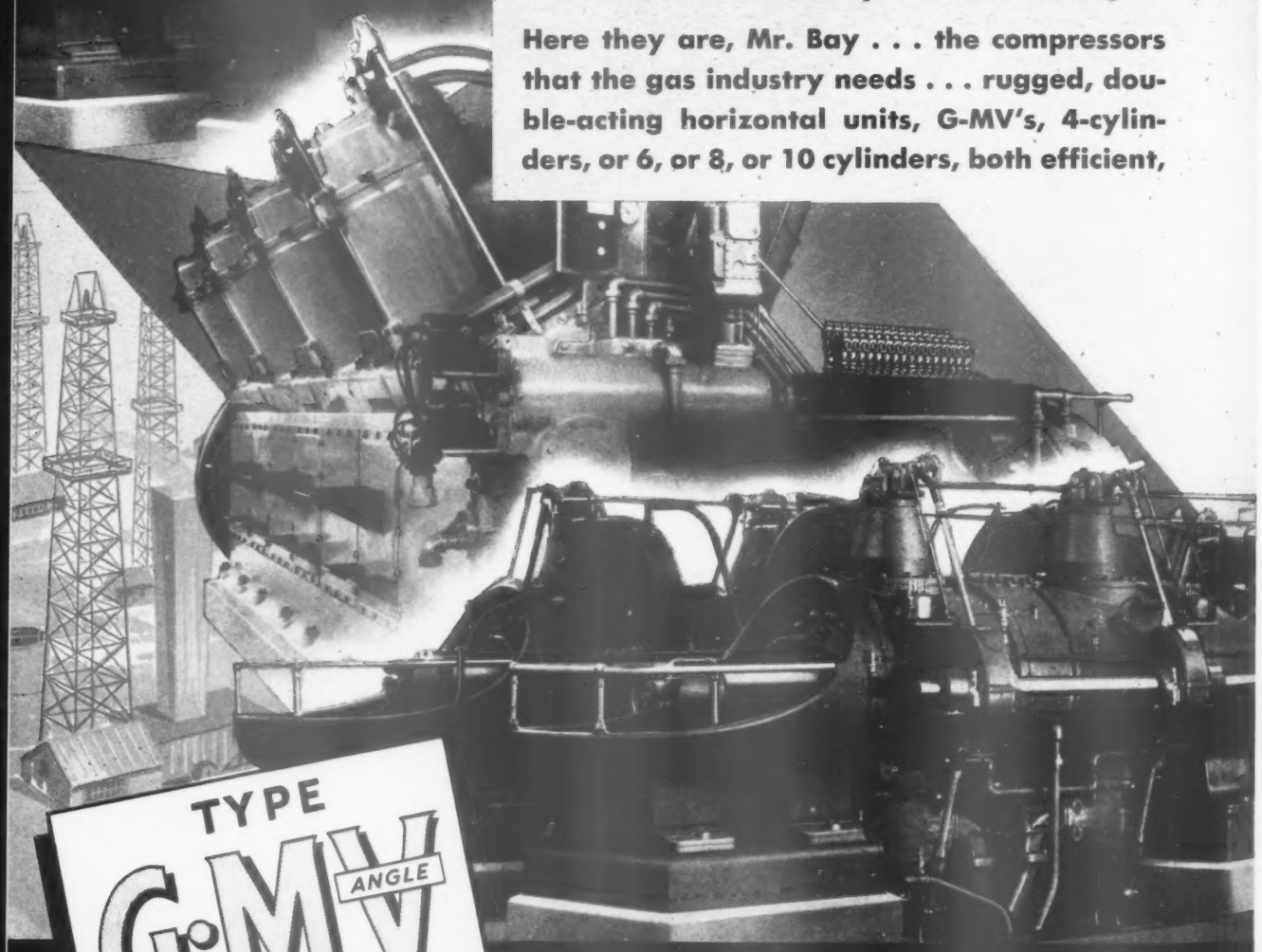
The motion of the polished rod transferred through sucker rods to the plunger of the sucker-rod pump results in the pumping cycle shown in Fig. 2. By reducing a number of different types of sucker-rod pumps to a schematic arrangement, such a pump is shown in Fig. 2 as composed of four parts, working barrel, plunger, traveling valve and standing valve. With the pump immersed in fluid, which is a necessary prerequisite for its operation, the upward motion of the plunger on the beginning of the upstroke, Fig. 2A, results in closing the traveling valve, because of the weight of the fluid above the plunger in the tubing. At the same time, because of the upward movement of

Here they are,



Said Burt R. Bay, Pres. Northern Natural Gas Co., Omaha, speaking at the Cincinnati Management Conference, *"The second phase of the gas-supply problem . . . may resolve itself into need for installing compressors . . . It is not something to postpone until the day of actual necessity; it is not a post-war problem; it is a must that calls for planning and execution in advance of the day of actual shortage."*

Here they are, Mr. Bay . . . the compressors that the gas industry needs . . . rugged, double-acting horizontal units, G-MV's, 4-cylinders, or 6, or 8, or 10 cylinders, both efficient,

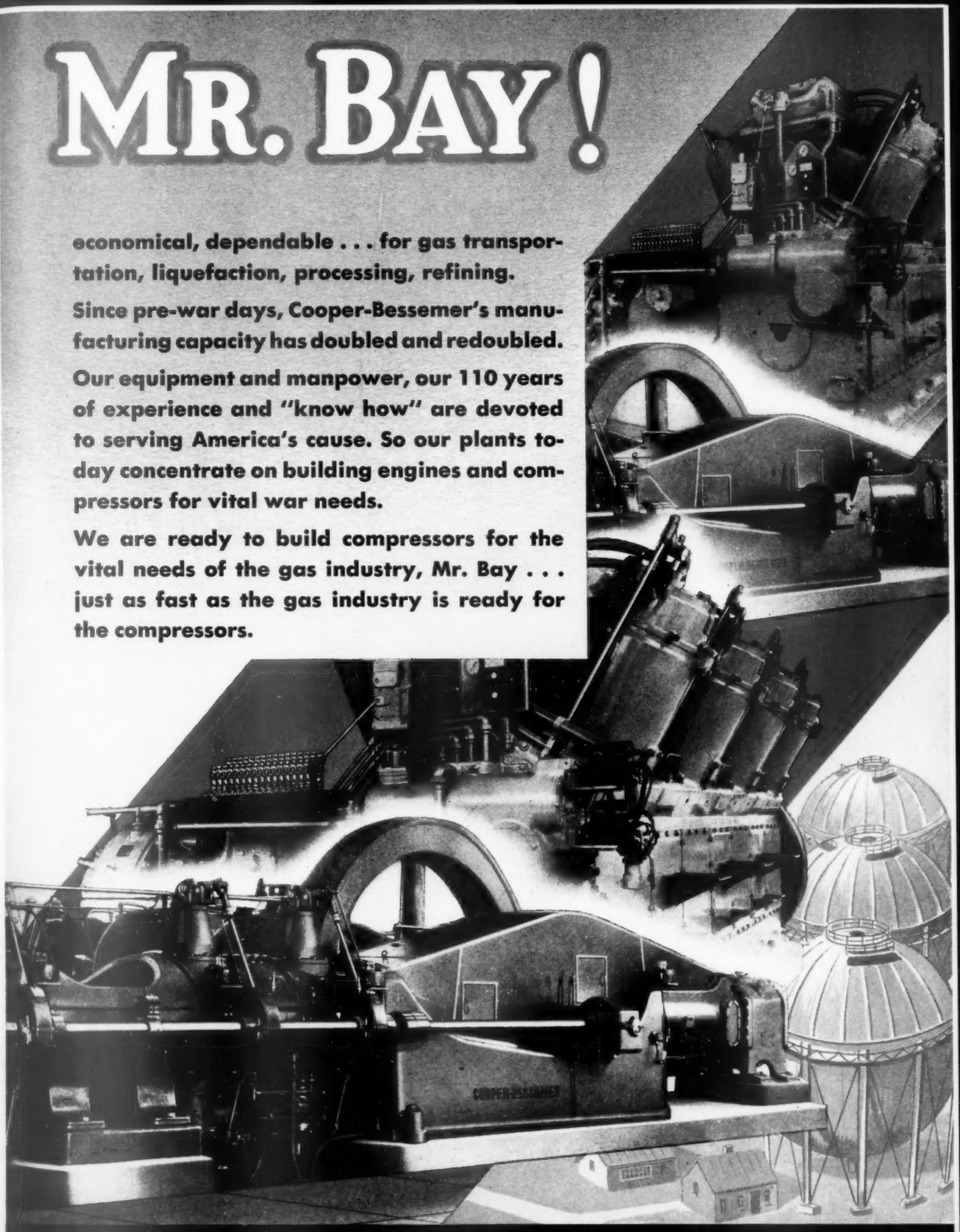


TYPE G·MV ANGLE

Compressor

New York Washington Bradford, Pa. Parkersburg, W. Va. Gloucester, Mass.

MR. BAY!



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the plunger, a decrease in pressure is created under the plunger in the working barrel, which results in the outside fluid opening the standing valve and entering and filling the space in the working barrel under the plunger. When the motion of the plunger is reversed after the top of the stroke has been reached, Fig. 2B,

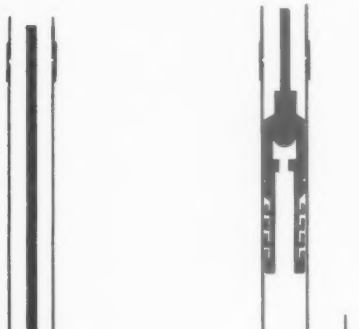


Fig. 2—The pumping cycle

the weight of the column of fluid is placed on the standing valve, closing it. At the same time opening the traveling valve permits the plunger to travel downward, through the fluid, to the point of beginning of the cycle. One of the most important characteristics of this cycle is the transfer of load of fluid in the tubing from tubing to sucker rods on the upstroke and from sucker rods to tubing on the downstroke.

The pumping cycle, as described above, is an oversimplification, for the purpose of basic illustration, of conditions as they occur in actual pumping operations. Such an ideal cycle would require complete filling up of the barrel with fluid on the upstroke and complete lack of interference by gas accompanying the fluid or by action resulting from the behavior of different parts of the pumping mechanism. Such conditions are very seldom encountered in practice. What is more important, for the plunger to follow exactly the motion of the polished rod and for the load to be transferred instantaneously at the bottom and at the top of the stroke, from tubing to rods and from rods to tubing, the pumping assembly would have to be rigid and a force applied at the polished rod would have to manifest itself instantaneously at the plunger. Neither of these two requirements can be fulfilled. Sucker rods and tubing are an elongated, elastic system. Their length changes with imposition and release of loads. A force applied at the polished rod can not be transferred with a velocity greater than the velocity of sound in steel. Actually, therefore, an interval of time must elapse before motion of the polished rod is transferred to the plunger. Further motion of the polished rod is required, before motion of the plunger in relation to the working barrel may start, because of stretch of rods due to transfer of load from tubing to rods. Other factors, to be discussed later, further complicate the actual plunger travel.

Loads.—Early investigators of occurrence and distribution of loads in a pumping mechanism recognized and concentrated their efforts on analysis and study of dead weight, friction, dynamic and shock loads. The dead-weight loads consist of the weight of fluid to be lifted plus the weight of the rods less the effect of buoyancy. The friction loads consist of plunger, rod and fluid friction. Dynamic loads are result of changes of velocity of rods and fluid. Shock loads are brought about by mechanical actions of different parts of the pumping mechanism. On the upstroke the dead-weight and friction loads on the sucker rods consist of the weight of rods, less the effect of buoyancy, plus the differential fluid load on the plunger (that is the difference between the weight of fluid in the tubing, supported by the plunger, and the pressure exerted on the plunger by the fluid in the well outside of the tubing) and plus the rod, plunger and fluid friction. On the downstroke these loads consist of the weight of the rods less the effect of buoyancy and less rod, fluid and plunger friction. The dynamic loads are added or subtracted from these loads depending on the change of velocity. The shock loads may take their effect at any point of upstroke or downstroke depending on time of their occurrence in the system.

Theoretical considerations and development of instruments for accurate measurements of loads on the polished rod, which load is the resultant of loads superimposed on each other in the sucker-rod string, made it apparent that the loads outlined above are not sufficient to explain the resultant loading of the polished rod. The explanation can be found in the existence of stress waves impressed and reflected on the rods because of mechanical vibration.[1]

Any material has its natural period of vibration if disturbed by an outside force. If a force[2,3] is applied to a fixed end of a rod, the other end of which is free, a stress wave, transmitting the force, will travel through the rod at a speed equal to the speed of sound in the material of the rod and in the form of a longitudinal wave. At the free end the force will be reflected and will return to the fixed end of the rod to be reflected downward again. Thus the natural vibration of the rod is instituted. Because of the effects of friction the intensity of vibration will gradually diminish and the vibration will eventually disappear. If another impulse is applied to the still vibrating rod, the second train of vibration may either help the first vibration or it may interfere with it reducing its magnitude. In the first case the vibrations are called synchronous in the second case nonsynchronous. Depending on phase angle and amplitude of vibrations there is an infinite number of combinations with which the two trains of vibrations may affect each other. To consider two extreme cases: (1) If in a system vibrating with certain frequency and amplitude another vibration, of the same frequency and amplitude is induced exactly in phase with the first vibration then the resulting vibration will have the amplitude exactly twice that of the original vibration; (2) If in a system vibrating with a certain frequency and amplitude another vibration, of the same frequency and amplitude is induced exactly 180° out of phase with the first vibration, then the two vibrations will cancel each other.

In case of sucker-rod strings two sets of vibrations are present: (1) Those resulting from the pumping motion of the sucker rods; (2) The natural vibration of the sucker-rod string. It is apparent that from the standpoint of the loads involved nonsynchronous conditions for these two sets of vibrations are desirable.

With velocity of stress transmission in sucker rods as 15,800 ft. per second in mind, Slonneger[3] derives the formula for the frequency of vibration of sucker rods

$$F = 237{,}000/D$$

where

F = frequency in cycles per minute
D = length of rods in feet

For instance, for a sucker-rod string 4,000 ft. long the frequency of vibration of the rods would be 237,000/4,000 = 59.25 cycles per minute. If the frequency of the pumping motion is the same, that is 59.25 cycles per minute (strokes per minute) conditions of synchronous vibration would exist.

(Continued on Page 78)

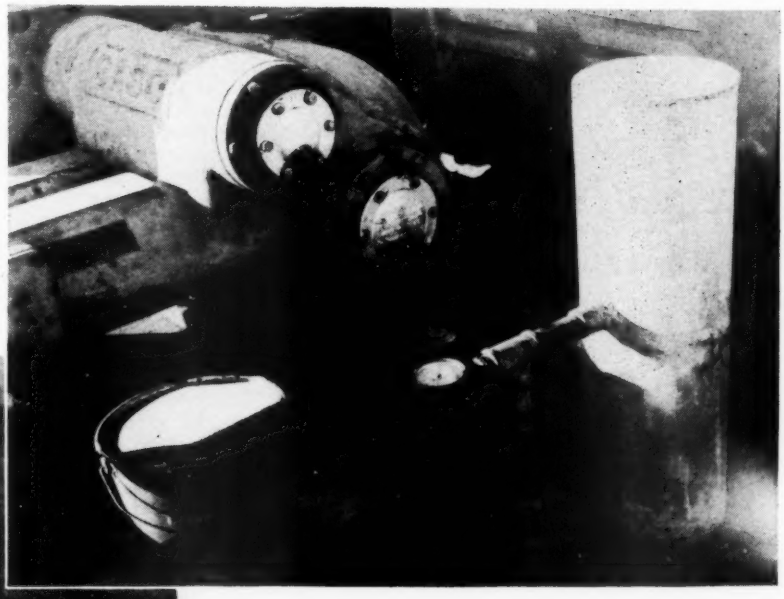
PIPE-LINE SUGGESTIONS

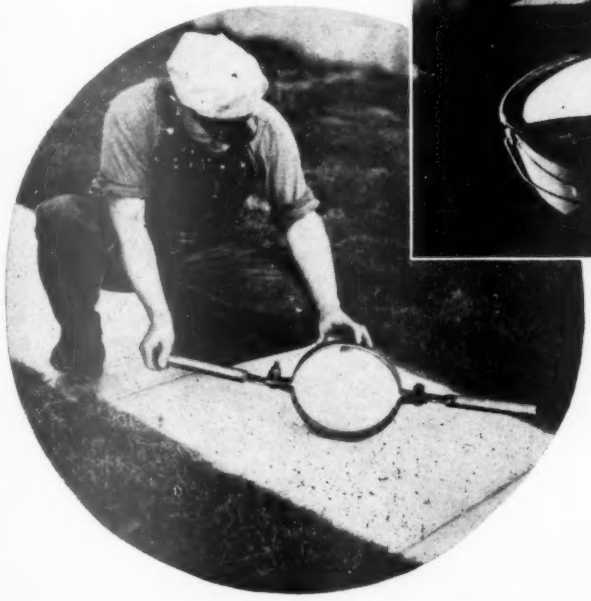
Pump Station Instrument Board Is Set Away From the Wall

AN instrument board has been made of wood panel for a large crude-oil pump station. Because of the way it was made it has proved to be both economical and convenient. Use of wood for this purpose is of particular advantage in wartime when material customarily used for such a board is hard to get. A special feature of the board is the manner in which it has been located at sufficient distance from the wall to do connection work behind it easily. Cleaning behind the board can be done better because of the large space. Needle valves are so manifolded that gages on various lines can be checked against each other to insure they are correct when gage readings are thought to be questionable.

Wrench for Grinding Inlet or Exhaust Valve

THE work of overhauling an inlet-valve assembly has been facilitated by using a wrench with long handles, making it easier to turn. In addition to being used for grinding inlet and exhaust valves, it is also used for holding the valve stem so that the lock nut can be tightened at the bottom of the stem.





Pressure Gage Between Gas Regulator and Volume Tank

TO give the operating staff an accurate check on the amount of pressure at an important point, a pressure gage has been installed between the gas regulator and the volume tank of an engine used in gathering-system service. By observing the gage it is possible to tell quickly whether the regulator has become clogged. In some cases this eliminates the need for disconnecting the light in order to detect the cause of the trouble.

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Separation of Paraffin and Naphthene Hydrocarbons

What commercial methods are used in the separation of naphthene and other hydrocarbons from the paraffin hydrocarbons that are found in a distillate oil?—B. E. J.

The elimination of all hydrocarbons, except the paraffins, from a distillate oil is far more difficult than might be inferred by reading the textbooks. Generalized statements are made in such books and even in learned technical articles which infer that a separation can be accomplished whereas in truth the statements refer only to low-boiling hydrocarbons or to the separation of two hydrocarbons from one another rather than the scores that probably constitute a distillate or gas oil.

Another misapprehension relates to the prevalence of the paraffin hydrocarbons. If paraffin hydrocarbons are defined as those which consist solely of saturated straight or branched chain hydrocarbons with no other appendages, there are numerous indications that very few (and small percentages) of such hydrocarbons exist in oils that are higher boiling than kerosene, perhaps only in paraffin wax. Thus, what we have glibly referred to as paraffin hydrocarbons, in spite of the fact that their properties were not those of paraffins, may have been mixed-type hydrocarbons which exhibited both paraffinic and naphthenic characteristics because the molecule was composed, in part, of both types of molecular structure.

The olefin, aromatic and tar-like materials can be removed with relative ease by several common methods, notably by treatment with sulfuric acid or extraction by solvents such as sulfur dioxide. These methods do not, however, remove the naphthenic hydrocarbons from the paraffin hydrocarbons. After treatment the stocks are found to contain nearly the same proportion of paraffins to naphthenes that exists in the untreated stocks, except that there is indication that the naphthenes are dissolved to a small extent. After treatment with even 2,000 lb. per bbl. of fuming (25 per cent SO_3) oleum, Mid-Continent kerosenes or gas oils still contain about 35 per cent of naphthenic hydrocarbons.

The best methods of preparing pure paraffin hydrocarbons would seem to be to synthesize them from low molecular weight paraffin hydrocarbons by polymerization or alkylation. The products of such processes might be further purified by fractionation into short-boiling-range fractions which may then be handled by fractional crystallization. Few selective solvents have been suggested for this purpose although such materials as methyl formate, methyl cyanide and ortha nitroanisole have been used in laboratory work.

Furnace Black From Low-Heat Gas

In continuation of the question on page 338 of The Oil and Gas Journal of March 25, 1943, the author is informed by the inventor (F.C.R.) of a furnace-black process that his process operates more satisfactorily on a gas which contains 30 per cent nitrogen than on regular natural gas.

In the past, furnace blacks have not been as carefully specified as the carbon blacks—consisting of a large variety of materials whose properties differed sufficiently from those of carbon black to not permit their inclusion under the name carbon black. Generally they were not as useful as the carbon blacks, but since the development of synthetic rubber, it is understood that certain furnace blacks are superior to carbon black when used for synthetic rubber. This has already been discussed on this page (March 11, 1943, p. 62).

Magnitude of Leaks In Gas Lines

How much gas leaks out when a pipe joint is not tight? We had an explosion and wondered if the joints were at fault?—A. V. M.

It happens that tests have been conducted for almost this exact situation. Faulty pipe joints and connections were connected to a butane-propane gas system at 6 oz. pressure and the extent of the leak was determined by measurements. In addition to measurements of the gas flow, the size of the leak was also judged by the size of flame produced and the noise of the leaking gas. A tabulation of nine such tests is given in Table 1.

In addition to the tabulated tests, several pipe connections that were in good condition were tested. It was found that the joints usually did not leak even when tightened only by hand.

Risk of Explosion

The tabulated tests indicate in a general way that a noisy leak is not a big leak. A number of joint leaks would have to all be leaking at the same time in order to produce an explosive mixture with air in even a small room. Leaking would have to take place for many hours and from several joints in order to produce an explosive mixture in a medium sized room. Finally, the joint leaks make some noise whereas a leak (Test 8) such as a broken or split fitting, a wide open burner, broken line, etc., may not make much, if any, noise and is therefore doubly dangerous.

TABLE 1

Connections	Test No.	Leak, cu. ft. per hr.	Audibility (ft.)	Flame size (in.)
Loose ½-in. cap and collar	1	0.750	6	..
Same, but tightened	2	0.718	6	2
Same, but tightened with long wrench	3	0.068	None	None
½-in. nipple and cap (loose)	4	1.760	10	10
Same, but tightened strongly	5	1.136	7	7
½-in. collar and 45° elbow (loose)	6	2.400	6	*8
Same, but tightened strongly	7	0.628	4	†4
Split ½-in. elbow	8	Large	None	
Flattened nipple and cap	9	1.460	6.5	‡5

*8-in. flame on collar, 1-in. flame on ell
†4-in. flame on collar, 1-in. flame on ell.
‡Three 5-in. flames.

Front Lines in REFINING

by Arch L. Foster

Natural-Rubber Plantations For Tropical America

IF synthetic rubber from petroleum, alcohol or whatever source is to supply America with its tires and hot-water bottles in future it will not be without competition, even from American hevea growers, judging from recent developments in natural-rubber production in this hemisphere. Fifteen Latin-American countries and the United States of America are cooperating in the Inter-American Institute of Agricultural Sciences (I.I.A.S.), Pan-American Union sponsored research group, in developing small farm-size methods for growing natural rubber for our needs.

One hundred cooperative nurseries have been established throughout the Americas, producing 30,000,000 budded rubber trees already. These trees are to supply small rubber farmers with buds and trees to start a new industry in the land from which rubber originally came. Leaf blight has been the downfall of hevea rubber in the Americas; blight-resistant strains of trees will be developed. A 1,000-hectare (2,471-acre) experiment station has been established in Costa Rica, Central America. Another has been built by the Brazilian Government at Belem, in the old para rubber country. Still another station has been built in Haiti, to grow trees to supply local rubber "farms." In Honduras the United Fruit Co. started a small plantation in 1926, which is to be expanded for these purposes. In Mexico 300 acres of grown rubber trees will supply buds, seedlings, etc., for further experimental work in that country.

"In the future," says Dr. Earl N. Bressman, director of the I.I.A.S., "it should be possible . . . to produce rubber (from trees) at 10 cents a pound or less." Farmers will be induced to plant small fields of trees and the product will be collected at central locations.

What this may mean is that we may produce in America the natural rubber that is now needed to combine with synthetic rubber to make certain types of products, such as heavy-duty tires. After the war the competition for the rubber market will become intensified and, very possibly, no matter what the good-sense national safety considerations may be the source which can produce rubber cheapest will likely get the business.

Catalytic Cracking, Alkylation Patents Issuing

IN the voluminous pages of the Patent Office Gazette two recent patents are mentioned, patents which apparently will, or may, have much to do with cracking and alkylation procedures in the future. These are U. S. Patents 2319209 on alkylation of hydrocarbons, issued to Don R. Carmody, assigned to Standard Oil Co. of Indiana, and 2319710 on catalytic cracking, issued to R. K. Stratford and assigned to Standard Oil Development Co. (New Jersey).

Carmody's process as outlined in claims plans a treatment of ethyl sulfuric acid, formed doubtless by absorbing ethylene gas in sulfuric acid, with one or more olefins having more than two carbon atoms per molecule, displacing the ethylene group and forming alkyl sulfuric acid with the olefin employed;

Alkylating isoparaffins with ethylene in the presence of aluminum chloride catalyst;

Alkylating isoparaffins with the alkyl group in the alkyl sulfuric acid in the presence of "strong" sulfuric acid, H_2SO_4, forming another alkylate;

Blending the two alkylates from the two separate steps.

No reason is given in claims, of course, for the formation of ethyl sulfuric acid or for release of the ethylene by a metathetical reaction with another olefin; very possible this step is one of concentration of the ethylene from a mixture with paraffins.

This patent very probably is involved in the process for synthesizing neohexane catalytically, announced some months ago by the Standard of Indiana.

The second patent, 2319710, evidently covers the Fluid catalytic cracking process. Heavy oil, i.e., heavier than gasoline, is vaporized under pressure at above 700° F., mixed intimately with a "finely divided siliceous catalyst," and allowed to react under more than 100 lb. per sq. in. pressure to produce gasoline hydrocarbons. Present tendencies in catalytic cracking, whatever the individual process is, seem to be following this intimate-contact-in-motion for both charge and catalyst.

Lithium Soaps in Lubricating Greases

RECENTLY lithium stearate was offered to the grease makers in commercial quantities for the preparation of lubricating greases. This product, its makers claim, combines the good points of sodium, calcium and aluminum soaps with few of their bad points, along with several good ones of its own.

Lithium stearate has a high melting point, like sodium stearate, in contrast to the low melting points of the aluminum and calcium compounds. Lithium stearate is insoluble in water and in most organic solvents, as are also aluminum and calcium soaps, while sodium soaps are water soluble, an undesirable property in a grease-making soap. Thus, lithium-made greases have the clarity of aluminum greases, the high melting point of soda greases—190° F. and up— and the water insolubility of calcium and aluminum greases.

Furthermore, lithium-base greases do not disintegrate in service, it is claimed, and have an extremely wide temperature range for the same product. One grease, it is said, with a given amount of soap in oil, may function properly at temperatures from 140° F. to minus 67° F., from tropical to stratospherical conditions.

Still further, addition of small quantities of lithium stearate to waxes greatly raises the melting point, due probably to jell formation about which relatively little is known. Larger quantities, 40 per cent of the stearate in montan wax raises the melting point from about 80° C. (176° F.) to 185° C. (365° F.); 40 per cent in carnauba wax boosts the melting point from about 85° C. (185° F.) to 210° C. (410° F.).

Remarkably, 20 per cent of the lithium stearate soap in paraffin wax raises its melting point from about 48° C. (118° F.) to 200° C. (392° F.). The great advantage in industrial and commercial uses of high-melting-point waxes makes this property of extraordinary value, as are those properties use to the refiners in grease making, more especially where wide temperature variations are encountered in service.

Sucker-Rod Pumping

(Continued from Page 70)

If the impulses are added at intervals which are equal to the natural frequency, then the vibrations are defined as "first-order vibrations." They are most severe, since each wave is augmented by new energy. "Second-order vibrations" are those in which impulses are added with frequency equal to half the natural frequency, etc. In the above example the speeds of 29.62, 19.75, etc., strokes per minute would be synchronous for a 4,000-ft. string of sucker rods and the vibrations would be of second, third, etc., order. Above and below those speeds the vibrations are nonsynchronous.

From the formula given above Slonneger prepared a series of curves, shown in Fig. 3, which give the pumping speeds, which are synchronous and nonsynchronous with natural frequencies for different lengths of sucker-rod strings. It should be realized that characteristics of individual wells may create conditions in which use of nonsynchronous speeds may not necessarily bring the beneficial results expected.

The above given general outline of motions and loads occurring in a sucker-rod pumping system should permit a more detailed discussion of the problems involved when the separate parts of the pumping mechanism are taken into consideration. Before, however, such a discussion is started, methods of measuring the loads in sucker-rod strings, the instruments used and the records obtained have to be considered first. They will be the subject of the next installment of this series.

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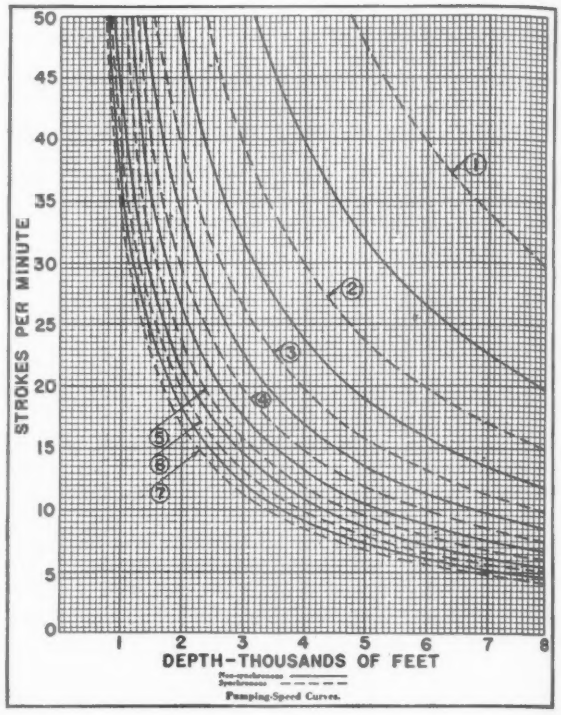

Fig. 3

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Operation of Improvised Compressor Units

(Continued from Page 64)

cylinders to be confined to pure air and the other to pure gas, the mixture taking place in the field line at a distance from the plant, reducing explosion hazard. If air-gas mixtures are compressed, some form of safety device should be employed to avoid the danger of explosion.

One of the best features of the use of eight cylinders is that it permits of two and three staging. The discharge from six cylinders may be recompressed in the two remaining cylinders for two-staging, and five may discharge into the intake of two, which in turn may discharge into one for a three-stage hookup.

The outfit shown in the photograph has been run for some time in our laboratory and will be given a thorough field test on a repressuring project.

Capacity

Any good pumper could make a similar outfit after looking at this one, and adapt it to the kind of power he has on this lease. An outfit of this size is sufficient for a lease of about two or three intake wells servicing perhaps 12 pumping wells. Where volume requirements are greater, additional units may be added. Varying pressure requirements may be met by single, two or three staging.

The compressors made from used automobile engines may be powered by other automobile engines, and if Ford V-8's are used they may be exchanged for rebuilt units when they begin to show wear.

In this war, materials are as important as men and in providing these materials, we have overcome all obstacles. With such accomplishments in mind, it is reasonable to demand more oil with less steel. But to do it requires new methods; so every new idea must be received with an open mind. This article suggests one way to get more oil with less steel. It is the author's hope that it will encourage more investigations along the lines suggested or even suggest new methods. Oil is ammunition, and to produce it, our oil sands become vast underground munition plants.

Acknowledgment

Acknowledgment is gratefully made of help from Henry Lane of the Dinsmoor Oil Co., Carl Lowrance of the Bradford Supply Co., and Dr. R. J. Piersol, Dr. A. H. Bell, Dr. J. S. Machin, W. F. Meents, A. W. Gotstein and G. G. Poor, all of the Illinois State Geological Survey.

Viscosity Classifications

(Continued from Page 61)

Required: Viscosity of mixture at 100° F. when this oil is prediluted with 20 per cent gasoline.

Solution: Use Chart 5. Connect the point marked "gasoline" on the left scale with the 181 seconds point on right scale and read the viscosity resulting from the intersection of the obtained sloping line with the 20 per cent line of the lower scale (low viscosity product). The result is 61 seconds, as read either on the left or right vertical scales.

Note: The experimental value was 61 seconds.

Aircraft Oils 65, 80, 100, 120.—The same method can be used for predilution of aircraft oils. Plot the 100° F. viscosity of the 65, 80, 100 or 120 grade oil on the right Saybolt Universal viscosity scale and connect the obtained point with the "gasoline" point on the left scales. Then the diluted viscosity at 100° F. can be found for any predetermined percentage of gasoline.

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Stabilization Plants
Compressor Stations
Power Plants
Helium Plants
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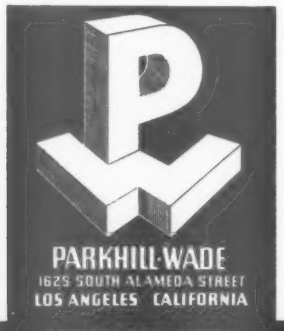

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ESTIMATING RISK IN DRILLING WELL

THE factors affecting the cost of drilling a well can be estimated in most cases rather closely, the major exception being that of the risk involved. The necessary data can be obtained from either the drilling contractor's record of previous experience in the same or a similar area or from the logs of wells drilled by other organizations. Knowing the number of days, number and size of bits, formations penetrated, moving and rigging up cost, mud required, etc., the one making the estimate can arrive at a reasonable figure of what he anticipates the cost will be.

The question arises as to how the probability of encountering a fishing job may be evaluated. This is followed by the question of how much should be allowed in the contract price for such unexpected trouble.

A partial solution to the problem is afforded by the experience of other wells drilled to a similar depth in the area or in the field. If the previous wells have encountered practically no difficulty, the allotment for risk can be reduced but never entirely eliminated. On the other hand, if the area, or field, is one characterized by stuck drill pipe, loss of circulation, fatigue of the drill string, crooked hole, etc., the risk factor must be increased.

If three out of four wells drilled in a field, or area, encounter some type of trouble, any proposed well has a 75 per cent chance of having a similar difficulty. The length of time required to cure the trouble should also be considered because of its direct effect on the cost. The greater the number of well records which can be investigated, either thoroughly or casually, the better the estimate of the possibilities of trouble.

The fact that trouble has developed on previous wells is in itself an aid as the one planning the operation knows what the particular hazards are and what can be done to avoid them. However, where the ego gets the better of sound judgment the risks may be disregarded in the attempt to prove personal superiority. If there is an available remedy or planned course of action to avoid potential difficulties, there is some justification for minimizing the danger; but if it is a case of depending on luck, or the belief that improvisations will suffice, regrets will probably be in order before the well is finished.

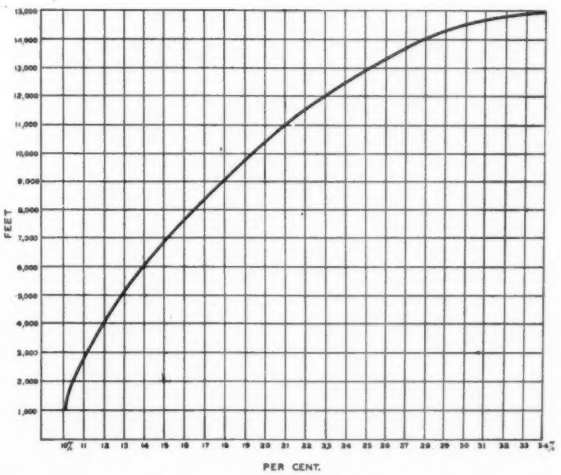
Whether one should take the average of all wells previously drilled which can give some indication of the risks or whether one should take only those wells on which trouble has occurred depends on the characteristics of the individual doing the estimating. The conservative ones are inclined to consider the worst that can happen and base their estimates on the former whereas the optimists are apt to believe they will have average or better than average luck.

To the estimated costs of the actual drilling, replacement of worn equipment, interest on investment, overhead, and a reasonable profit, there must be added compensation for the risk if the contractor is to keep operating. This compensation for risk can generally be considered as being the number of days spent in overcoming trouble multiplied by the day rate charged for the rig, plus any special tool rental which might be involved. Contractors prefer to have at least an amount equal to the reasonable profit available for fishing jobs and unforeseen trouble. After a period of good experience, the contractor can reduce his risk factor as the danger is not great and he already has risk fund built up.

The increase in risk with depth is a problem with a number of variables. For one thing, depth alone is not the controlling factor as the types of formations drilled affect the time and cost of the well. After drilling through a certain formation, overcoming the particular difficulty which it causes and arranging for its future control, it is often possible to drill several thousand additional feet with practically no trouble. After reaching that point, the next interval of a thousand feet or less might be fraught with difficulties. There might be no more hazard in drilling to 5,000 ft. than to 3,000 ft. in a particular area but in drilling to 5,800 ft. the risks might double or triple those to 5,000 ft. Consequently, the risk with depth in any particular area is a series of steps trending upward.

Drilling dangers do increase as the well gets deeper due to the time factor involved, the length of the drill string and the complication of various conditions found in the formations drilled through. A 10,000-ft. well drilled under the same conditions and through the same formations as a 5,000-ft. well would be considerably more than twice as hazardous.

One engineer has worked out the accompanying chart for the change in risk factor with depth. This chart is based on the average well rather than on a specific area or a particular field. It is a starting point in the attempt to arrive at a reasonable and sound charge for the risk involved. If the well is to be drilled in a trouble-free area, the risk factor can be scaled down and if the area is notorious for its difficulties a higher risk charge can be made.



The chart is a plot of depth against the percentage of the contract price which should be available for offsetting major difficulties. Or, it can be used as the amount by which the sum of the cost, replacement and depreciation charge, interest on investment and reasonable profit must be increased for adequate risk compensation. The result will not be the same in both cases, the variation being 1 to 9 per cent depending on the well. The inclusion of the risk factor is why the price for drilling to 4,000 ft. in a particular area might be $3.75 per foot while drilling to 6,000 ft. might require a price of $7.50 per foot

The Oil Bank of America

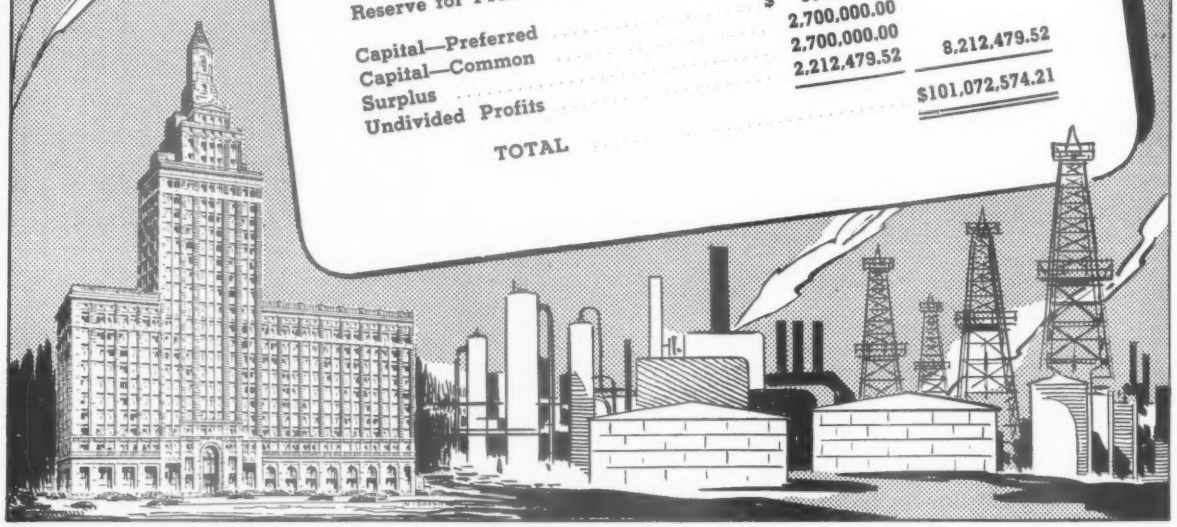
Statement of Condition June 30, 1943

RESOURCES

Cash and Due from Banks	$36,449,711.65	
U. S. Government Securities	40,738,462.95	
Other Bonds and Warrants	4,281,421.91	$ 81,469,596.51
Loans and Discounts		16,669,086.16
Overdrafts		874.06
Income Receivable Accrued		190,656.98
Prepaid Expenses		19,860.50
Stock in Federal Reserve Bank		180,000.00
Bank Premises		2,542,500.00
TOTAL		$101,072,574.21

LIABILITIES

Deposits		$ 92,676,052.94
Income Collected, not Earned		39,007.63
Reserve for Taxes, Interest, etc.		136,034.12
Reserve for Preferred Dividends		9,000.00
Capital—Preferred	$ 600,000.00	
Capital—Common	2,700,000.00	
Surplus	2,700,000.00	
Undivided Profits	2,212,479.52	8,212,479.52
TOTAL		$101,072,574.21



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MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

FACTORS IN ARTIFICIAL LIFT COSTS

IN areas where wells will not flow initially or where flowing wells have entered the pumping stage, the lifting cost of the oil represents a major item of expense. To operate a property economically it is necessary that the proper choice be made as to the type and size of pumping equipment installed.

In most instances local conditions will determine the type and size of installation most desirable. However, in all instances the initial investment will be one of the dominant factors influencing the choice between various types of equipment. After considering various initial investment costs, local conditions of corrosion, paraffin deposition, availability of suitable energy supply, formational characteristics, pumping fluid levels and amount of fluid to be lifted will require proper evaluation.

The artificial lift installations in common use are gas lift, hydraulic systems, electrical systems, geared power units and individual beam units. Each of these possesses advantages under favorable conditions, and the choice of the proper type and size installation will have an important bearing upon the ultimate profit derived from any property.

To determine the desirability of the various type installations for a given condition assume that an 11-well lease with 4,000-ft. wells drilled upon 10-acre locations is to be equipped with artificial lifting equipment. The approximate initial costs, exclusive of tubing, of the various units will be as follows:

Gas-Lift Installation:	
11 surface intermitters at $1,000 each	$11,000
Lines, connections, fittings, etc., at $500 per well	5,500
Total	$16,500
Hydraulic Installation (assuming one power pump installation. If additional power pumps are necessary, the cost will be increased proportionately):	
11 subsurface units at $900 each	$9,900
1 surface power pump	2,500
1 prime mover	1,200
Connections, lines, fittings, installations, etc	13,000
Total	$27,600
Geared Power Installation:	
Engine, power, jacks, rod lines, etc.	$24,000
11 strings of sucker rods at $1,100 per well	12,100
11 subsurface pumps at $70 each	770
11 installations at $60	660
Total	$37,530
Individual Pumping Units:	
11 beam units at $2,000	$22,000
11 prime movers at $700	7,700
Installation charges at $500 per well	5,500
11 strings of sucker rods at $1,100 per well	12,100
11 subsurface pumps at $70	770
11 installations at $60	660
Total	$48,730
Electrical Installation:	
11 units complete with motor, pump, cable, operating equipment and miscellaneous fittings	$49,335
11 pump installations at $60	660
Total	$49,995

In addition to initial investment and local conditions, the operating costs, operating efficiencies, maintenance costs, replacement costs and salvage value will require proper consideration.

The above approximate initial investment figures on a per-well basis are as follows:

Type of installation—	Initial investment per well
Gas lift	$1,500
Hydraulic system	*2,510
Geared power	3,412
Individual beam unit	4,430
Electrical system	4,545

*Conditional upon the use of one power pump installation.

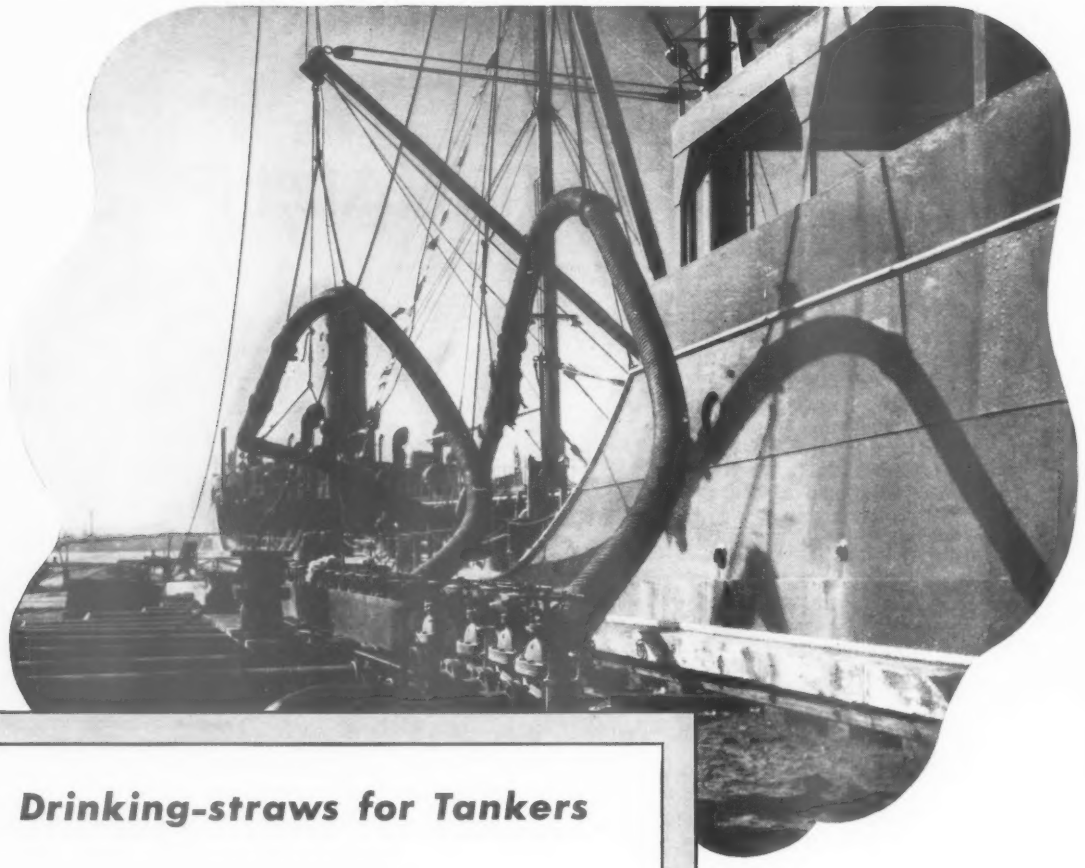
The gas-lift method requires the lowest initial investment and if all other factors are favorable to this type installation, then the gas-lift method would be most desirable. However, in some areas a suitable supply of gas will not be available. If high-pressure gas must be purchased or if low-pressure gas is available for compression, then the cost of the gas supply will be an important consideration. In addition to the local factors previously enumerated the performance of the individual wells on gas lift will require proper consideration. It is to be noted that surface intermitters are included in the initial investment figures presented, and in some cases this type of equipment will not be necessary with gas lift. If intermitters are not desirable, then the initial investment for gas lift will be still lower.

The hydraulic method is the next lowest in initial investment cost, only if one surface pump is required. Consideration must be given to the possible need of additional surface equipment if, later in the life of the well, additional fluid must be lifted. In addition to initial cost, the use of this method will depend upon individual well conditions affecting the efficiency of this type of installation. Some factors to be considered in addition to those previously presented are the submergence available, amount of sand production, paraffin deposition in annulus between tubing strings, and the amount of gas produced with the oil. All of these factors require individual treatment since they are too variable to permit generalized consideration. An advantage of this type of installation that is of value in some areas is the ease of treating emulsions. The treating compound can be injected into the power oil stream to be in contact with the oil and water during the time the fluids are moving from the bottom of the hole to the surface.

The geared-power installation is higher in initial investment than the gas-lift or hydraulic systems. Geared-power units are not adaptable to lifting the volumes of fluid that other installations are. However, their simplicity of operation is advantageous in areas where larger volumes of fluid do not have to be handled.

Individual beam units, although higher in initial investment, will prove advantageous in certain areas. Beam units are quite flexible in operation and can be adjusted for varying well conditions. The feasibility of this type of installation will depend largely upon estimated maintenance expense, subsurface equipment life and pump efficiency in addition to the various local conditions previously enumerated.

While the electrical system represents the highest initial investment cost there are many areas where the need for lifting large volumes of fluid at relatively low cost will offset the initial investment. The initial cost of electrical units varies greatly depending upon the lift necessary and the volume of fluid to be pumped. The investment figure presented for comparison is for a pump capable of lifting about 400 bbl. of fluid per day against a lift of about 4,000 ft. Any variations in these requirements will appreciably influence the initial cost. The investment cost presented assumes the use of purchased power. In the event that purchased power is not available, then the cost of generating energy becomes an important factor in the use of electrical equipment. Electrical units can utilize smaller tubing than the other installations.



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Engineering Fundamentals No. 96

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

TEMPERATURE SURVEYS FOLLOWING CEMENT JOBS

IT is rather simple to calculate the theoretical amount of cement required to fill to a given height behind a casing string of a given size in a hole drilled with a given diameter of bit. Unfortunately, however, the actual conditions in a well rarely agree sufficiently with the theoretical conditions that the top of the set cement is at the depth which theoretical calculations would indicate. The top of the set cement may be below the theoretical point because of caving of the walls or because of absorption of the cement slurry by highly permeable formations. On the other hand, the top of the cement may be above the theoretical point because of incomplete filling of the annular space due to channeling of the cement slurry.

It is very important to know where the top of the cement is located behind the casing in order to determine whether the cement job on a given well has been properly executed. For example, excessive loss of cement slurry to a cave or permeable formation near the bottom of the hole may mean that possible producing formations at a higher level are not properly protected and may be flooded with water from adjacent strata because of not being covered with set cement. Similarly, one may base calculations of cement volume on the premise of having sufficient cement behind the pipe to aid in the protection of casing adjacent to a corrosive-water sand at some distance off bottom; while caving or loss of cement into lower formations could prevent the cement from reaching to sufficient height to give the desired protection. It is true also that channeling to any great extent is objectionable, since such a condition can allow passage of fluid from one formation to another and also allow more extensive contact of corrosive fluids with the outside of the casing.

Purely from an operation standpoint, assuming that there is a sufficient height of unchanneled cement behind the casing to give adequate protection, it is desirable to have a record of the location of the actual top of the cement on each individual well. Such information is particularly useful in recovering casing from a well that is to be abandoned, since one knows exactly where to part the string in order to recover the uncemented portion.

For the various reasons given above it is important to determine the level of the top of the set cement behind casing before attempting to produce the well. It is also important to make such a determination a part of the permanent record for each well. A temperature survey is the most suitable means of making this determination. Since cement generates considerable heat while setting, the temperature of the well bore opposite the setting cement will usually be markedly greater than the natural temperature of well for that depth. Thus, the cemented section may be recognized by the decided temperature increase inside the casing for some period following the completion of the cement job. As a general rule, the temperature survey should be made within a day or two following the placement of the cement in the well. It is not considered safe to wait longer than 3 days following the completion of the cement job before making the survey. In certain cases, depending on the nature of the formations surrounding a well, readable temperature anomalies caused by the setting of cement can be obtained after a period as long as 5 or 6 days.

Temperature Gradients

In this discussion it seems appropriate to present hypothetical temperature gradients showing qualitatively the temperature gradients obtained following cementing jobs of various kinds and under various well conditions. Actual temperature gradients have been published in the references given at the end of this discussion and may be compared with the theoretical gradients presented here.

In Fig. 1, the dotted Curve A shows

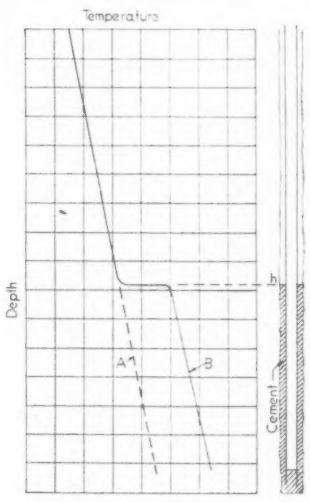

Fig. 1

the normal gradient for a well; that is, it indicates the general trend of temperature with depth if the temperature were undisturbed by the presence of cement undergoing the process of setting. Suppose, however, that the casing were cemented to some point h, as indicated by the sketch to the right of the plotting. The heat generated by the cement would cause a temperature rise in that portion of the well so that the gradient taken at this time would deviate from normal and follow the general trend indicated by Curve B on to the bottom of the cemented section. The amount of the increase in temperature at point h would depend upon the length of time that had expired since the completion of the cement job, and also upon the nature (particularly the thermal con-

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

ductivity) of the formations surrounding the well. On actual surveys, this increase in temperature at the top of the cement has been found as high as 30° F.

On many wells the top of the cement will be found much lower than the calculated depth because of the presence of caves or highly permeable formations. In such a case, the location of the cave or the absorbing formation can often be recognized from examination of the plotted temperature gradient. This is possible because of the fact that the greater amount of heat generated opposite the excess quantity of cement will produce a greater temperature anomaly. The type of gradient that may be obtained under these conditions is illustrated in Fig. 2, where Curve

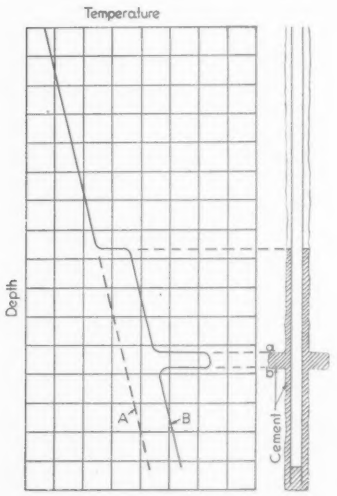

Fig. 2

A represents the trend of the natural gradient in the well while Curve B represents that obtained a few hours after cementing. The greater increase in temperature between points a and b indicates the presence of a large cave or highly permeable formation which absorbed a lot of the cement slurry.

Temperature surveys can be applied to the location of the cement

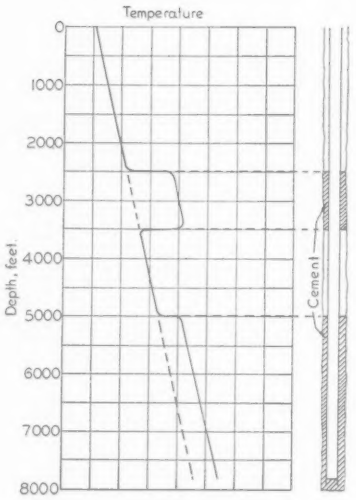

Fig. 3

from both stages of a two-stage job. In Fig. 3 is represented the type of gradient that would be expected on a well cemented with the cement from the lower stage coming from bottom up to 5,000 ft. and with the upper stage, pumped through perforations at 3,500 ft. reaching up to 2,500 ft.

Variations in Gradients

It should not be concluded from the idealized gradients presented that smooth gradients will be observed on a temperature survey. Even the gradient below the top of cement is usually quite irregular. As already pointed out, certain irregularities are due to variation in the quantity of cement at different levels. Another cause of such irregularities is the difference in the thermal properties of various formations. As mentioned in Installment 95 of this series, water sands have a higher thermal conductivity than shales. Thus, a water sand will more quickly remove the heat generated by the cement than will a shale. Because of this fact the presence of certain sand sections may be detected, or substantiated, by irregularities in the temperature curve of the cemented section. This type of irregularity is of the nature illustrated in Fig. 4. Such data are of value as corroborative evidence in correlation of well logs.

Since the amount of increase in temperature caused by the setting of cement depends upon the difference in temperature of the setting cement and the adjacent formations, it is easier to locate cemented zones at shallow depths where the formation temperatures are relatively low as compared to great depths. It is possible that at greater depths, the formation temperature can be high enough that the setting of cement will not cause a temperature anomaly.

The location of cement behind casing is probably the most valuable and most universally used application of temperature surveys in oil wells.

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Leonardon, "The Economic Utility of Thermometric Measurements in Drill Holes in Connection With Drilling and Cementing Problems," Bull. of the Society of Petroleum Geophysicists, Vol. 1, No. 1, Jan. 1936, pp. 115-126.

(See also references listed at end of Installment 95 of this series.)

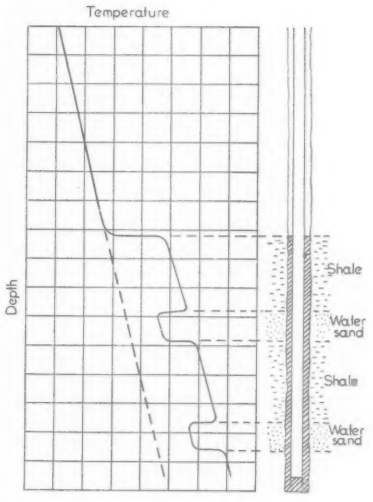

Fig. 4

Natural Gas

Tennessee Line Given Tentative Approval

WASHINGTON, D. C.—A certificate of convenience and necessity will be issued to the Tennessee Gas & Transmission Co., for a 20-in. natural-gas line from Louisiana to Kentucky, if applicant will present satisfactory evidence of ability to finance the line, ability to obtain adequate supplies of natural gas and authorizations from the War Production Board for the required materials. This decision was reached last week by the Federal Power Commission which called a hearing for September 8 for the purpose of affording the applicant an opportunity to comply with the FPC reservations.

Decision of the commission to approve the Tennessee Gas & Transmission application, if the company can satisfy requirements of the bureau, followed in less than 2 weeks the filing of a request by Hope Natural Gas Co. for permission to construct a 22-in. line from the Hugoton field of Kansas to Kanawha County, West Virginia.

The Office of War Utilities, a bureau functioning directly under the War Production Board, is considering several possible methods of augmenting the Appalachian gas supply from more prolific producing sources in the Southwest but has not indicated what program it will favor. The line proposed by the Tennessee Gas & Transmission Co., the FPC said last week, would deliver gas to its northern terminal to companies now serving the Appalachian region.

"Estimates of supply and demand," declared the FPC, "covering systems handling 80 per cent of the Appalachian region's requirements, indicate that for the year 1943 the shortage will run to some 15 billion cubic feet. The 1943-44 peak day estimate will not be met by approximately 300 million cubic feet.

"There appears to be no relief for the shortage from sources within the region. It is clear from the testimony of record that for a considerable period none of the companies operating in the region has had material quantities of gas available for sale to one another in addition to existing transactions. In fact, officials of the companies in the area indicated that relief must come from outside the region.

"Upon the record before us," said the commission, "it is apparent that no purpose will be served by further laboring the obvious. It is crystal clear that additional natural gas is needed in the Appalachian region. It follows, therefore, that a realistic view of this situation definitely shows that the public convenience and necessity will be served by the construction and operation of the applicant's pipe line into the area, if the additional showing is made."

The facilities involved in the application of Tennessee Gas & Transmission Co. would consist of a pipe line from near Opelousas, La., through the states of Louisiana, Mississippi, Alabama, Tennessee, and Kentucky to a northern terminal near Ashland, Ky. The projected route passes near Natchez, Miss., Muscle Shoals, Ala., and Nashville, Tenn. According to the application, the company intends later to seek a certificate for a branch line taking off from Brace, Tenn., and extending east by way of Chattanooga and Knoxville, to Asheville, N. C.

Three Columbia Gas Units Win Approval for Merger

HARRISBURG, Pa. — Conditional Public Utility Commission approval was given today for the merger of the Manufacturers Light & Heat Co., Manufacturers Gas Co., Pennsylvania Fuel Supply Co., and Greensboro Gas Co. into a new $37,550,000 corporation. All are subsidiaries of the Columbia Gas & Electric Co. and have producing and distribution facilities in Pennsylvania, West Virginia and Ohio.

The continuing company, Manufacturers Light & Heat Co. of Pittsburgh was also granted permission to purchase the Fayette County Gas Co. which was operated as a unit with the four companies.

Southern United Allowed To Acquire Subsidiaries

WASHINGTON, D. C. — Southern United Gas Co., Fort Smith, Ark., last week was authorized by the Federal Power Commission to acquire and operate facilities of its wholly owned subsidiaries operating in Arkansas and Oklahoma. Subsidiaries which Southern United will acquire under the FPC order are Arkansas-Oklahoma Gas Co., Industrial Oil & Gas Co., Ozark Natural Gas Co., Southwestern States Gas Co., Twin City Pipe Line Co., and Western Oklahoma Gas Co.

The Twin City, Industrial, and Ozark companies operate in Arkansas, the Western Oklahoma company in Oklahoma, and the other two subsidiaries in both states.

Market outlets are almost wholly within Arkansas with approximately 3 per cent of total sales in Oklahoma.

Cayuga and Long Lake Are Closed Until Gas Is Taken

AUSTIN, Tex.—Complete cessation of oil and gas producing operations in the Cayuga and Long Lake fields in Anderson, Henderson and Freestone counties, East Texas, effective July 15, except those delivering to recycling plants was ordered last week by the Texas Railroad Commission. Wells delivering gas to recycling plants which are returning all residue to the producing formation will be permitted to continue operations.

"The commission finds," states a clause explaining the order, "much natural gas is still being flared and vented in the fields in unjustifiable amounts. Much of this gas is so-called low-pressure gas and that as of this date purchasers in said fields have not fully and adequately made equipment available to compress this gas so that it can be taken into a gas line so that it may go to market."

The shutdown order will remain in force "pending further study, looking to the prevention of this avoidable physical waste of natural resources." Several days ago the Lone Star Gas Co., Dallas, Tex., announced that its engineers were studying the possibility of compressing low-pressure gas in the Cayuga and Long Lake fields for the purpose of introducing it into the company's main line running into the interior of Texas.

Natural Gasoline

Contract Awarded for New Turner Valley Plant

CALGARY, Alta. — Contract has been awarded for construction of a $373,000 addition to Royalite No. 2 absorption plant in South Turner Valley. The expansion is part of a project for production of alkylate being developed by the Royalite Oil Co. in conjunction with Allied War Industries, Ltd.

The new absorption plant is in the wet-gas area of Turner Valley and its output of aviation-gasoline components will be used as a blending agent for aviation gasoline.

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REFINING

Economy of Petroleum Processes Compared to Alcohol Base Guided Canadian Rubber Program

TORONTO, Ont. — Inauguration of limited styrene production last week at the Canadian Government's synthetic-rubber plant was accompanied by disclosure that the petroleum-base process was selected largely for economic reasons.

C. D. Howe, minister of munitions and supply, disclosed some pertinent cost figures last month in reviewing the Canadian synthetic-rubber program before the House of Commons.

After explaining that the alcohol-producing facilities of Canada were incapable of furnishing the raw material for butadiene manufacture, Mr. Howe added:

Butadiene Costs Compared

"It is estimated that the cost of conversion alone in the production of industrial alcohol is approximately 10 to 12 cents per gallon from grain. Taking grain at, say, 80 cents a bushel, the cost of production for industrial alcohol from grain would run from 50 cents to 60 cents a gallon. If industrial alcohol is produced from whiskey distilleries. the cost may range over 80 cents per gallon. For instance, in order to get our styrene plant into production as early as possible, we have found it advisable to purchase a limited quantity of ethyl alcohol for this purpose. The cost of this material laid down at the plant is 88 cents per gallon, and, according to our information, this high cost will have the effect of increasing the cost of finished styrene by about 1,000 per cent. It is estimated that a U. S. gallon of alcohol yields approximately 2.2 lb. of butadiene and that the theoretical yields of butadiene from alcohol and butane, respectively, are 59 per cent and 93 per cent by weight, and that the cost of producing butadiene from industrial alcohol is about three times the cost of production from butane.

"In order to equalize these costs, the purchase price of grain would have to be 25 to 30 cents per bushel. This is, perhaps, one of the reasons the farm bloc in the United States is not pressing further for the use of grain in the production of butane. Under present conditions it can be applied to many other purposes which will yield the farmer a higher price. . . .

"The plant at Sarnia," the Canadian minister concluded in his discussion of the rubber program, "was designed to meet the full war needs of Canada, and we expect it to do so. It will not meet the peacetime needs in addition, but after the war is over it will wholly meet the peacetime needs, with some allowance for industrial expansion. The Government is investing between $40,000,000 and $45,000,000 in the production of artificial rubber."

Earlier in his review, Mr. Howe enumerated the considerations which influenced the selection of petroleum-base processes for manufacture of butadiene and styrene.

"The main decision made in Canada," he told the House, "was to erect a plant capable of producing 54,000 long tons of buna-S rubber per annum and the two basic materials required for its manufacture, namely, butadiene and styrene. Butadiene could be produced either from alcohol or from a petroleum base. A survey showed:

Factors in Decision

"1. That the total facilities for the production of alcohol in Canada would produce less than one-third of the alcohol that would be required to provide the butadiene equivalent of the rubber required for the Canadian war program.

"2. That the combined cost of building additional facilities for the production of alcohol and the cost of building plants for the manufacture of butadiene from alcohol, were greater than the costs of building a plant capable of producing a similar quantity of butadiene from petroleum.

"3. That in the cracking processes involved in recovering butadiene from petroleum we could recover ethylene, the principal basic material required for the manufacture of styrene, and could also recover isobutylene, the very cheap basic material used in the manufacture of butyl rubber.

"4. That we could procure the butadiene, ethylene and isobutylene required for the production of 54,000 long tons of buna rubber and 7,000 long tons of butyl rubber without materially detracting from our normal gasoline and oil supplies.

"5. That we had in Canada an oil refinery fed by pipe line which would

enable us to centralize the operations in one point and be assured of continuous production whereas production of butadiene and styrene from an alcohol base would be contingent upon having a ready supply of tankers and tank cars.

Reasoning Involved

"The projected plan provided a self-contained economical and efficient operation for the following reasons:

"1. The best available location selected provided an adequate area adjacent to one of the largest refineries in Canada, served by water, rail and highway transportation and at a relatively short distance from the plants of the Canadian rubber industry engaged in the production of tires, which will consume about 85 per cent of the synthetic rubber to be produced.

"2. By extending the cracking facilities of one of the largest refineries in the country, we could obtain the desired quantities of three gases for which a limited use had previously been found, namely, ethylene, isobutylene and butylene on a relatively low-cost basis.

"3. By erecting styrene, butyl and buna-S copolymer plants nearby, these gases can be transferred by pipe line without the costs, complications, difficulties and dangers involved in their transportation by tank cars."

Canada's Polymer Corp. Starts Rubber Operation

SARNIA, Ont.—The first operation at the Polymer Corp. synthetic-rubber plant here started on July 1 when the Dow Chemical Co. of Canada began manufacturing styrene. Within a few weeks completion of a distillation unit is expected, after which the processing of the styrene will be carried out here in its entirety.

Owing to the fact that the remainder of the Polymer plant is still under construction, the styrene output will be utilized by United States rubber plants till it is required here.

Frontier Aviation Plant To Be Finished in 60 Days

CHEYENNE, Wyo.—Frontier Refining Co. expects to place in operation immediately after its completion about September 20, a $5,000,000 aviation-gasoline refinery being constructed for it by Defense Plant Corp. The plant is a thermal and catalytic-cracking and alkylation-processing unit and is said to be the only one being built in the Rocky Mountain area. Its total capacity will be 5,000 bbl. of which 1,600 bbl. will be high-octane aviation gasoline.

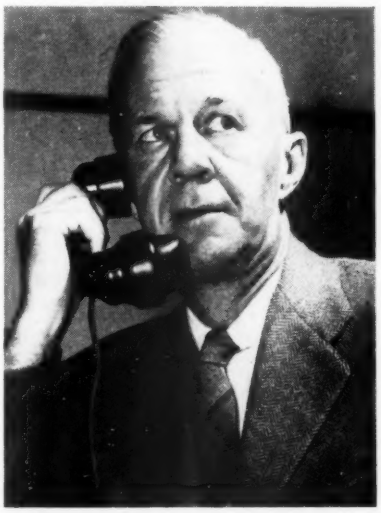
Sketches of Plant Operators

DR. M. R. Schmidt, a member of Standard Oil Co. of Indiana for 26 years and assistant general superintendent of the company's Whiting, Ind., refinery, was promoted to general superintendent at Whiting July 1. Dr. Schmidt succeeds the late F. D. Rexwinkle.

Dr. Schmidt received his A.B. degree in 1906 and doctor of philosophy degree in 1909 from Johns Hopkins University, specializing in chemistry, physical chemistry and geology. Upon receiving his doctor's degree he became analytical and research chemist with a pharmaceutical manufacturer at Baltimore, Md. Dr. Schmidt moved to New York City in 1911 to engage in technical journalism and editorial work. In 1914 he became head of the analytical and research laboratories of a manufacturer of fine and heavy chemicals at Brooklyn, N. Y., where he served for 3 years.

Dr. Schmidt joined Standard of Indiana in 1917 as a member of the research staff at Whiting. In 1919 he became assistant to the head of the lubricating department and 4 years later assumed direction of that department. He was promoted to assistant general superintendent of the Whiting refinery in 1931.

Dr. Schmidt is a member of the Whiting-Robertsdale and East Chicago Chamber of Commerce and was formerly on the executive committee of the Whiting Boy Scouts. He is married and has a daughter, Gwendolen, who is a student at the University of Chicago.



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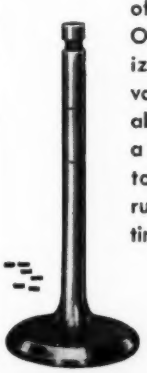

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PIPE LINES

WEP Completion Ceremony Scheduled at 2 p.m. July 19

The last joint in the War Emergency Pipelines, Inc., 24-in. crude-oil system, terminating at New York and Philadelphia refining centers on the East Coast, will be welded near Phoenixville, Pa., with appropriate ceremonies at 2 p.m., July 19. The last weld will be made at Phoenixville junction, 12 miles east of the town of the same name and about 35 miles northwest of Philadelphia.

From Phoenixville junction, where the 24-in. terminates, two 20-in. branch lines extend on to Pennsylvania and Maryland refining centers at Marcus Hook, Philadelphia and Baltimore and the other will feed crude to plants near New York, mostly in the Bayonne-Bayway district of New Jersey.

Steady progress was reported this week on the other major WEP project, the 20-in. products line from the Houston-Beaumont area on the Texas Gulf Coast. Completion of the products line to Norris City is scheduled for September 1 at which time railroad transportation facilities currently moving crude from the intermediate terminal of the 24-in. system will be converted to shipment of refined oils.

Crude at the rate of about 100,000 bbl. daily will be directed into the 731-mile eastern extension of the big-inch line until the system is filled to the eastern terminals. Meanwhile, the difference in receipts at Norris City, Ill., and the 100,000 bbl. per day earmarked for filling the extension will continue to move east by tank cars and by northern and eastern pipe-line facilities. The arrangement has the advantage of simultaneously maintaining essential crude supplies to eastern refineries while line-filling operations are proceeding.

Humble Removing Atlas Line for Gas Service

SHREVEPORT, La.—Humble Oil & Refining Co. this week was reported to be removing the 44-mile 8-in. line acquired recently from Atlas Oil & Refining Co. for removal to South Texas, where it will be relaid and used as a gas line.

The Humble Oil & Refining Co. official who confirmed the purchase and plans for removal from its present location between Longview, Tex., and Shreveport, La., declined to give details on where the pipe is to be used.

Removal of the line, however, ter-

PIPE-LINE PERSONALITIES

A C. WILKINSON, newly appointed manager of Continental Oil Co.'s pipe-line department, was born at Rayner, Tex., and attended school at Stanton, Tex.

Joining Continental as a mechanic in the pipe-line division in 1924, he had previously been employed in New York City as an erecting engineer.

He was named superintendent of the Oklahoma-Kansas division of Continental Pipe Line Co. in 1931, and became district superintendent in 1932.

Mr. Wilkinson was appointed general superintendent of the oil pipe line and terminal division on November 1, 1939, and on May 1, 1943, was promoted to be manager, pipe-line department. In his present position he has charge of nearly 2,000 miles of line operated by the company.

minated the possibility that North Louisiana crude would be delivered through it to the Longview pumping station of the War Emergency Pipelines, Inc., 24-in. system which originates at that point.

Tank-Car Shipments East Suffer Moderate Decline

WASHINGTON, D. C.—A decline of 33,292 bbl. in the daily average loadings of petroleum for tank-car shipment to the East Coast was reported here last week by the Petroleum Administration for War, covering the week ended July 3. Loadings for tank-car shipment to eastern terminals averaged 960,362 bbl. daily.

"A slight drop in tank-car loadings," declared Ralph K. Davies, deputy petroleum administrator, "was not unexpected after two consesutive weeks of substantial increases. There is a time lag between loading of cars and return of empties to the loading point. Sudden jumps in loading mean more cars en route loaded and therefore often result in fewer empties to load the following week.

"We are going to bring in more oil, month by month. In the 4 weeks ended June 26," he continued, "the total overland movement was 1,366,939 bbl. per day compared to 998,960 bbl. daily in the same period last year. That is an increase of 36 per cent, but we are not stopping there. With each succeeding month, the figure will be considerably higher."

Contract Awarded for Sinclair Product Line

TOLEDO, Ohio.—Construction will be started promptly on Sinclair Refining Co.'s new $6,000,000 products line from East Chicago, Ind., to Toledo, under terms of a contract awarded last week to the Exeter Construction Co., Camp Hill, Pa.

The new 200-mile line will be constructed partially of used pipe reclaimed from Sinclair facilities in the Southwest and Middle West. When completed, the line is scheduled to carry 30,000 bbl. of gasoline daily from Sinclair's East Chicago refinery to storage facilities and a new dock on the Maumee Bay front, Toledo.

When shipping conditions permit, some of the products moved eastward by the new line will be transported via tankers through Lake Erie to western New York.

Hand-Welded Seams Found In Captured Jap Pipe Line

American forces occupying Guadalcanal have found Japanese petroleum transportation facilities, consisting of 4¾-in. o.d. pipe with ⅛-in. walls. Apparently the seams have been welded by hand, it was reported recently by Shipfitter R. B. Killbuck, who was a welder employed by United Gas Pipe Line Co., Shreveport, La., before joining the Seabees.

He accompanied his communication to the company with a picture showing himself and another welder repairing a part of the line captured from the Japanese forces. The Japs wrapped the line with burlap and then dipped the joints in hot tar, coating both the inside and exterior of the pipe.

Michigan Gas Operators Ask Approval on New Lines

MOUNT PLEASANT, Mich.—Consumers Power Co. has requested permission to extend its Saginaw-Flint main line from the McBain terminal in Missaukee County 5 miles into the new Winterfield pool and to build a 32-mile 10-in. line from the new Woodville pool in Newaygo County to Six Lakes on the Lansing pipe-line system. Mecosta Pipe Line Co. has asked for authority to build 11 miles of 6-in. line from Big Rapids into the new Goodwell pool in Newaygo County.

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Exploration and Drilling

Week's Highlights

THE Rocky Mountain area holds the spotlight this week while there are indications of interesting developments in other areas, including West Texas and Mississippi. When Tensleep production was opened up at Elk Basin, Wyoming, in the closing weeks of 1942, it was believed that the find was of major importance. Discovered in 1915, the field has produced about 11,000,000 bbl. from the Frontier and Dakota formations. The structure had thus been outlined in these higher pays and operators were confident that the Tensleep producing area would be of considerable size. There is always the possibility, however, that structures become steeper with depth, especially if there is an unconformity between them and the upper pays. They thus tend to cover a smaller area.

This tendency has certainly not been followed by Elk Basin. Where the Frontier reservoir covered an area of 580 acres, the new pay has been proven by scattered wells over an area 4 miles long and from 1 to 2 miles wide. With more than 50 ft. of saturation reported, a yield of 12,000 bbl. per acre appears conservative and if future drilling confirms the continuous pay suggested by widely scattered outposts, the field's reserves may exceed those of Salt Creek which has produced more than half of the state's production to date. The field has an excellent chance of having additional production in the Madison, which produces at Frannie, about 10 miles to the east.

That the Madison will prove of increasing importance in the Rocky Mountain area is indicated by showings reported at two wildcats in Montana, southwest of the Cut Bank field (p. 94).

A showing of oil reported in a rank wildcat in Reeves County, Texas, (p. 96) is also of considerable interest. Reeves County, together with Culberson, Hudspeth and Brewster have been of importance mainly as large counties from which big chunks of royalty could be sold in the East. A few tests have been drilled but these have shown little. If the Wentz well now reported as showing oil proves of commercial importance it will extend development in the Delaware basin far to the west of the present development along the flank of the Fort Stockton high.

Mississippi (p. 115) shows promise of its third discovery of the year. If it materializes it will have a profound effect on prospecting in the southeastern states. In the first place, it is near the Alabama State line and far east of other successful development in the state. Of still greater importance is the fact that the prospective pay is the Tuscaloosa which is equivalent to the Woodbine. The latter formation produces throughout the East Texas basin and, of course, is the pay in the East Texas field. Discovery of Tuscaloosa production to the east of the Mississippi embayment will thus lead to a combination structural and stratigraphic trap play which could easily cover a large part of two states.

ALBERTA: Saturation has been found in a test of the Athabaska River area north of Edmonton and close to the Alaska Highway (p. 104).

OKLAHOMA: A good Cromwell sand pool opener is reported north of the Dill pool in Okfuskee County (p. 109).

CALIFORNIA: A gas field has been opened up in the Thornton area, Sacramento County (p. 95).

LOUISIANA GULF COAST: Another showing in the Wilcox is reported from the deep test in the Reddell area, Evangeline Parish (p. 100).

NORTH TEXAS: Simpson and Ellenburger showed oil on test in a Montague County wildcat (p. 105).

COMPLETIONS IN ALL FIELDS . . .

(Week ended July 10, 1943)

	Oil	Gas	Dry	Total	Footage	Total comp. to date 1943	1942
N. Y., Penn., W. Va.	52	26	1	79	155,210	1,709	1,837
Ohio	4	11	11	26	56,226	427	533
Indiana	0	0	2	2	4,886	121	173
Kentucky	2	0	5	7	15,323	184	116
Illinois	17	0	12	29	70,979	862	834
Michigan	6	3	6	15	29,373	263	355
Kansas	18	2	11	31	102,212	799	764
Nebraska	0	0	1	1	3,422	15	21
Missouri-Iowa	0	0	1	1	2,834	8	9
Oklahoma	6	1	8	15	46,651	565	666
Texas:							
North Central Texas	12	0	30	42	94,975	653	622
West Texas	15	0	2	17	69,161	429	840
Texas Panhandle	3	1	0	4	11,801	92	217
Eastern Texas	1	0	0	1	4,698	137	204
Texas Gulf Coast	8	0	3	11	66,412	220	413
Southwest Texas	11	1	7	19	90,931	453	668
Total Texas	50	2	42	94	337,978	1,984	2,964
North Louisiana	1	2	2	5	17,631	157	246
Louisiana Gulf Coast	6	1	8	15	113,384	188	273
Total Louisiana	7	3	10	20	131,015	345	519
Arkansas	3	0	2	5	22,441	125	77
Mississippi and Southeast	0	0	3	3	19,482	49	30
Montana	3	0	0	3	6,589	98	95
Wyoming	0	0	0	0	0	54	49
Colorado, Utah	0	2	0	2	13,691	8	8
New Mexico	5	0	0	5	16,689	111	126
California	26	0	5	31	85,034	656	407
Total United States	199	50	120	369	1,120,035	8,383	9,573
Total previous week	190	28	116	334			
Week ended July 11, 1942	169	44	127	340			

ROCKY MOUNTAIN AREA

Elk Basin Proving Second In Size to Salt Creek

DENVER, Colo. — The Elk Basin field in northern Wyoming continued to yield one surprise after another this week when the several wildcats at the north and south ends, out beyond the limits of the old shallow pool, showed for producers in the new Tensleep horizon. They indicate that the productive area will be at least 4 miles long and between 1 and 2 miles wide, with the limits still undefined in any direction. The major development of the week was the showing in the Mackinnie Oil & Drilling Co. 2 Northern Pacific, NE NW NW 5-57n-99w, 1 mile south and ¼ mile east of the discovery, which gave indications of being the largest producer in the field. It cemented the 7-in. at 4,709 ft. and picked up the top of the Tensleep at 4,711 ft. It cored 51 ft. of saturated sand, then drilled 80 ft., after which it resumed coring and continued to 4,877 ft., total depth. After penetrating 166 ft. of the Tensleep zone, including a few thin breaks, tubing was run, and it was opened for 35 minutes. In that period it flowed at the rate of 185 bbl. an hour. It was then shut in to rig up christmas tree and erect tankage. The ratio of gas to the oil appeared to be higher than in any of the other wells.

The Mackinnie company, of which James Donoghue is president, made a contract last April with Fred Goodstein, of Casper, for a one-half interest in the company's block of 1,600 acres in exchange for the drilling of 10 wells without cost to the company.

Two wells on the Montana side, at the north end of the structure, shared important developments with the Mackinnie company. The Stanolind Oil & Gas Co. 1 Dengler, SW NE 35-9s-23e, in Carbon County, the most northerly test in the area, was reported unofficially to have topped the Embar at approximately 5,375 ft. and to have cored saturation in the Embar at 5,378-85 ft., and after drilling around 70 ft. to have picked up the Tensleep, and found the formation saturated. It is 4 miles north and 1½ miles west of the Mackinnie well, and outside the productive area in the Frontier sands. The other well in that area is Minnelusa Oil Corp. 1 E-T Zimmerman, NE NE SE 34-9s-23e, ¾ mile west and a little south of the Stanolind well, which is unofficially reported to have started coring into the Tensleep at around 4,900 ft., and to be showing for a producer.

The Yale Oil Corp. 1 Watson, NE NE SE 36-58n-100w, 3 miles south of the Stanolind well and 1½ miles west and north of the Mackenzie well, which was reported last week showing 5,000 ft. of oil in a drill-stem test at 5,409-20 ft., open 30 minutes, resumed coring and after going through 71 additional feet of the Tensleep zone, reached the break between the upper and lower sands. It set pipe in the break and is waiting for tankage before perforating and testing. It showed no water. It will not drill the lower section of the Tensleep at this time.

Freak well at North McCallum.— The Continental Oil Co. 5 Pollock, C NE SW 2-9n-79w, North McCallum field, Jackson County, Colorado, ¾ mile northwest of the discovery, completed in 1926, made 192 bbl. of 46-gravity oil and 10,000,000 cu. ft. of carbon dioxide gas on the official gage. That does not tell the entire story of this unusual completion, however, as extreme caution had to be used in finishing the test. It is producing through the casing, perforated at 4,950-5,100 ft., and was given no opportunity to perform as other wells in the field did when they came in. The reservoir appears to be about 90 per cent full of carbon dioxide gas, a well drilled down on the flanks in the hope of missing the gas and bringing in the oil showing the same conditions as exist on top. The oil appears to be in the gas, and not the gas in the oil. When cores were taken in the saturated zone, they came out dry, although ordinarily they would have been bleeding. It is believed that if the volume of gas the well is allowed to flow was increased, the oil would disappear. Also, it is entirely possible that if the well were opened to capacity it might produce at the rate of 100,000,000 cu. ft. per day, but it would not flow for that length of time. Past experience shows that within a few minutes everything in and aboveground would become frozen solid. The horizon in which the oil and gas were found will require careful analysis by the geological department to identify it. When coring it had all the earmarks of the Frontier, but when it passed out of the zone the cuttings resembled the Morrison. Tools from the well are being moved to South McCallum to resume drilling on 4-A Hoye, which shut down last winter at 1,281 ft.

COLORADO COMPLETIONS

Douglas Creek, Rio Blanco County: Superior Oil Co. 1 Government, NW NW SW 5-3s-101w, joint with Continental Oil Co. and Union Oil Co. of California, T. D. 8,564 ft., P.B. to the Dakota-Lakota at 4,326-4,420 ft., for 9,700,000 cu. ft., gas, shut in.

North McCallum, Jackson County: Continental Oil Co. 5 Pollock, NE SW 2-9n-79w, T.D. 5,127 ft., 7-in. 5,124 ft., perf. in sand at 4,950-5,100 ft., 192 bbl. oil and 10,000,000 cu. ft. carbon dioxide gas.

MONTANA COMPLETIONS

Cut Bank, Glacier County: William Hanlon 1 Tribal-226, SE NE SW 25-32n-6w, T.D. 3,137 ft., 7-in. 3,072 ft., Cut Bank 3,072-3,113 ft., main pay 3,109-13 ft., swabbed 48 bbl. first 20 hr., shot and swabbed 200 bbl.

Kevin-Sunburst, Toole County: McKnight & Stock 5 State, NW NW NE 16-35n-2w, T.D. 1,639 ft., Ellis-Madison 1,610-39 ft., acid, 70 bbl.

B. A. S. Aronow 6 Government, SE SW NW 21-35n-3w, T.D. 1,813 ft., contact 1,800 ft., acid, 42 bbl. per day.

Oil show in Montana wildcat.—A. B. Cobb & Co. 1 Allotted-223, NE NW NW 4-29n-8w, on the Blacktail structure, Pondera County, Montana, 20 miles southwest of the Cut Bank field, topped the Madison lime at 5,114 ft., cored limestone showing oil at 5,114-22 ft., and stopped to set the 7-in. at 5,110 ft. before drilling in and testing.

(Continued on Page 122)

DAILY AVERAGE PRODUCTION FOR WEEK

	July 10 crude oil	July PAW quota all oils	July 3 crude oil
Arkansas	76,800	77,200	75,700
California	778,750	827,000	770,500
Colorado	6,100	7,000	6,285
Eastern fields	100,550	113,100	96,750
Illinois	220,700	233,000	208,000
Indiana	13,800	14,500	14,500
Kansas	280,150	300,000	280,100
Louisiana	349,100	331,300	335,900
North Louisiana	*85,100*	.....	*85,100*
Louisiana Gulf Coast	*264,000*	.....	*250,800*
Michigan	55,600	60,100	56,100
Mississippi	51,200	50,000	55,000
Montana	22,025	21,800	23,120
Nebraska	2,150	2,200	2,200
New Mexico	100,050	105,700	98,750
Oklahoma	335,050	361,400	335,500
Texas	1,615,600	1,727,000	1,548,400
East Texas	*371,000*	.....	*350,400*
West Texas	*245,600*	.....	*236,100*
North Central Texas	*137,700*	.....	*134,300*
East Central Texas	*128,000*	.....	*125,500*
Texas Panhandle	*90,400*	.....	*90,200*
Texas Gulf Coast	*559,900*	.....	*534,100*
Southwest Texas	*83,000*	.....	*77,800*
Wyoming	92,070	97,200	89,640
Total United States	4,099,695	4,328,500	3,996,445
Total production Jan. 1-July 10, 1943			749,981,280 bbl.
Same period last year			721,751,790 bbl.

Gas Discovered in Eocene In Sacramento County

LOS ANGELES, Calif. — Amerada removed any doubt about the value of its discovery in the Thornton district of Sacramento County this week by completing 1 Capital flowing 6,800,000 cu. ft. of natural gas daily through a 40/64-in. bean. This discovery well was carried down to 8,367 ft. but when the Cretaceous was found barren the hole was plugged back to 3,390 ft. and 138 ⅜-in. holes perforated at 3,355-80 ft. The flowpressure gages showed 806 lb. on the tubing and 1,192 lb. on the casing and shut-in pressures of 1,387 lb. on tubing and casing. The log shows top of the Markley at 2,325 ft., top of the Nortonville at 2,612 ft., the Capay at 3,355 ft. and top of the sand member in Cretaceous was 4,454 ft. The newly discovered Thornton gas field is located in the Delta region of the Sacramento Valley and production is coming from rocks of Eocene age as is the case in other adjacent fields.

Gas tests are being drilled at numerous points in the central part of the state and it is in this region that the most success has been achieved to date. In the Suisun district of Solano County at the extreme eastern end of Suisun Bay, Standard has spudded in 1-A Honker in 25-3n-1w and has a derrick standing for 3 Suisun Community in 5-3n-1w. Shell is making good progress with its first test in the Marysville Buttes gas field of Sutter County, which produces from Cretaceous formations surrounding a volcanic plug, necessitating careful selection of locations in order to miss the edges of the plug and hit the gas sand. The existence of natural gas was proved up by Buttes Oilfields, Inc., several years ago, but a few dry holes put a severe drain on the finances of the company and it was deemed advisable to make a deal with Shell whereby the latter took over the properties subject to an overriding royalty.

Development work in the Lodi gas field of San Joaquin County is proving a costly undertaking and will probably require additional extensive drilling before the real significance of this discovery becomes apparent. Based on the results of drilling to date, it looks like there may be two separate accumulations of natural gas as Bankline's discovery well to the northwest is too far removed from Amerada's original discovery to the southeast to be on the same structure, and especially since a dry hole has been drilled in the gap between the two locations. Those familiar with the general area lean to the opinion there may be several productive locations along a long general northwest-southeastward trend. Amerada has completed two gas wells at Lodi, and Bankline Oil Co. has finished one commercial producer. The search for natural gas also extends to Willows in Glenn County, Bowerbank in Kern County where Texas proved up a new field some time ago, as well as at several points in Contra Costa County, Walnut Grove in Sacramento County and in Tehama County.

Fresno County.—Standard will complete its second well in the Pleasant Valley field within the next few days as an effective water shutoff has been secured on the 7-in. casing at 8,980 ft. and the crew is back in the hole. Top of the Pleasant Valley oil sand, probably equivalent to the Gatchell in the Coalinga Nose field and the McAdams sand in the Kettleman North Dome field, was logged at 8,979 ft. This makes the well somewhat lower structurally than the two wells already completed. Upon its completion, Standard's 26-21-F in 21-20s-16e will be the most easterly producer in the field and will require an offset in the northwesterly part of 28-20s-16e. Based on the results of drilling to date, the Pleasant Valley field will have a northwest-southeast trend and not an easterly trend as was originally anticipated. The southwesterly limits of production have been defined by a dry hole but the other limits are still undefined. The most northerly well under way at present is R. S. Lytle's 86-20-F in 20-20s-16e and from the results observed to date it appears quite probable that a major part of the field will be located north of Standard's holdings in Section 29-20s-16e.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge, South, Kern County: Belridge Oil Co. 65-34-A fee, 34-28s-21e, pumped 80 bbl., 14.3-gravity, 24 per cent cut, T.D. 1,012 ft., perf. 540-1,012 ft., South Belridge zone of Pleistocene age.

C.C.M.O. Co. 11-6 B.F., 11-29s-21e, pumped 27 bbl. net, 14.1-gravity, 35 per cent cut, T.D. 1,350 ft., P.B. 1,081 ft., 997-1,080 ft.

Buena Vista Hills, Kern County: Standard 55-27-B fee, 27-31s-23e, pumped 225 bbl. net, 25.5-gravity, 28 per cent cut, T.D. 3,475 ft., perf. 3,113-3,470 ft., Buena Vista zone of Pliocene age.

Standard 112-7-D fee, 7-32s-24e, pumped 33 bbl. net, 27.2-gravity, 50 per cent cut, T.D. 3,360 ft., perf. 3,105-3,360 ft., in Buena Vista zone of Pliocene age.

Standard 103-11-D fee, 11-32s-24e, pumped 58 bbl., 19.8-gravity, 15 per cent cut, T.D. 2,862 ft., perf. 2,800-60 ft.

Coalinga, East, Fresno County: Shell 157-15 fee, 15-19s-15e, pumped 55 bbl., 17.6-gravity, 1 per cent cut, T.D. 1,440 ft., perf. 1,256-1,327 ft., 1,346-76 ft., 1,426-38 ft., completed in East Coalinga zone of Miocene age.

Standard 113-35-A fee, 35-19s-15e, pumped 25 bbl., 20.6-gravity, 4 per cent cut, T.D. 3,220 ft., perf. 3,113-3,215 ft.

Coalinga, West, Fresno County: Standard 119-13-D fee, 13-20s-14e, pumped 50 bbl., 13.7-gravity, 4 per cent cut, T.D. 1,589 ft., perf. 1,155-1,350 ft., 1,430-1,583 ft., completed in West Coalinga zone of Pliocene age.

Texas 7-C, 6-20s-15e, pumped 4 bbl., 16.9-gravity, 1 per cent cut, T.D. 2,478 ft., perf. 2,432-78 ft.

Cymric, Kern County: Honolulu 62-26 Fitzgerald, 26-29s-28e, pumped 120 bbl. net, 13.1-gravity, 64 per cent cut, T.D. 1,288 ft., perf. 1,134-1,288 ft., located water entry 1,175 ft., completed in Cymric zone of Pliocene age.

Devils Den wildcat district, Kern County: E. & S. Oil Co. 1 Devils Den, 26-25s-18e, dry in gray sand, T.D. 1,020 ft.

Elk Hills, Kern County: U. S. Navy 23-34-S, 34-20s-24e, pumped 320 bbl., 18.3-gravity, 10 per cent cut, T.D. 3,102 ft., perf. 2,999-3,033 ft., 3,053-3,100 ft., completed in Tupman zone of Pliocene age.

Kern Front, Kern County: Honolulu 8-78, 8-28s-27e, pumped 9 bbl. net, 12.9-gravity, 35 per cent cut, T.D. 3,061 ft., P.B. 3,038 ft., perf. 3,010-38 ft., Kern Front zone of Pliocene age.

National Oil Co. 5 Standard, 11-28s-27e, pumped 50 bbl., 14-gravity, 20 per cent cut, T.D. 1,903 ft., perf. 1,632-1,900 ft.

Standard 52-15 fee, 15-28s-27e, pumped 41 bbl. net, 13.3-gravity, 60 per cent cut, T.D. 2,275 ft., perf. 2,012-2,275 ft.

Kern River wildcat district, Kern County: G. P. Corp. 1 Bradford, 15-28s-28e, dry, T.D. 2,995 ft., upper Vedder 2,683 ft., lower Vedder 2,935 ft.

Lodi wildcat district, San Joaquin County: Bankline 22-1-A Community, 22-4n-7e, dry, T.D. 2,725 ft., top 9-1 sand 2,384 ft., Capay shale 2,384 ft.

McKittrick, Kern County: East Puente Oil Co. 3-A, 11-30s-21e, pumped 30 bbl. oil, 13.3-gravity, 1,000 bbl. water, T.D. 1,246 ft., perf. 3,030 ft., perf. 2,927-3,013 ft., Midway zone of Pliocene age.

Midway-Sunset, Kern County: C. C. M. Oil Co. 58-9 fee, 9-32s-23e, pumped 29 bbl. net, 19.9-gravity, 25 per cent cut, T.D. 3,030 ft., perf. 2,827-3,013 ft., Midway zone of Pliocene age.

C. C. M. Oil Co. 62-9 fee, 9-32s-23e, pumped 28 bbl., 13.8-gravity, 12 per cent cut, T.D. 1,960 ft., perf. 1,811-1,937 ft.

Richfield 11 Fairfield, 11-31s-22e, pumped 172 bbl., 15.9-gravity, 0.1 per cent cut, T.D. 1,339 ft., P.B. 1,300 ft., perf. 1,111-1,298 ft.

Texas 21 M. S. Pool, 36-31s-22e, pumped 64 bbl., 18.9-gravity, 24 per cent cut, T.D. 1,662 ft., P.B. 1,560 ft., perf. 1,207-1,477 ft., 1,538-58 ft.

Riverdale, Fresno County: Amerada 52 Clemente, 22-17s-19e, flowed 244 bbl., 38.5-gravity 0.7 per cent cut, 116,000 cu. ft. gas, 14/64-in. bean, flow pressure 540 lb., T.D. 7,985 ft., perf. 7,920-30 ft., Lawton zone of Miocene age.

Temblor wildcat district, Kern County: F. J. Haddock 1 Akern, 24-29s-20e, dry, T.D. 2,644 ft.

LOS ANGELES BASIN

Orange County.—Signal Oil & Gas Co. has passed 4,000 ft. in 1 Willow Community, 19-6s-10w, in the Newport district without finding the pay encountered by D. W. Elliott a few months ago. Signal's wildcat is west of the discovery well. Both of these wells are relatively close to the shore

(Continued on Page 122)

PERMIAN BASIN

Oil Showings Reported in Reeves County Test

MIDLAND, Tex. — L. H. Wentz 1 Rounsaville, wildcat located in Section 23, Block C-13, Public School Land Survey, 12 miles west of Balmorhea, southern Reeves County, was reported to have showed oil on pits in drilling to 3,095 ft., and was preparing to run drill-stem test. The well has experienced difficulties with crevices, losing circulation several times in drilling to its present depth. Elevation of the wildcat is 3,635 ft.

Andrews County.—Magnolia Petroleum 1 B. B. Ralph, NE NE Section 20, Block A-38, Public School Land, 8 miles southwest of the Fullerton Clear Fork lime pool, offered encouragement of opening a new productive area when it had show of oil stains in cores taken from 8,157-8,223 ft., and a drill-stem test from 8,150-8,225 ft. showed 250 ft. drilling mud slightly cut with gas, and the test was drilling ahead. The test had been abandoned at total depth of 6,434 ft. and original deepening plans were to carry it to 8,000 ft., which depth was passed last week. Union Oil Co. 1 J. D. Biles, NW NE Section 19, Block A-31, Public School Land, 4 miles northwest of Fullerton pool, was reported to be running high on top of the Clear Fork lime topped at 5,980 ft., with surface elevation 3,381 ft., and was drilling below 6,400 ft. in lime.

Pecos County. — A good well was assured at Magnolia Petroleum and Anderson - Prichard 1 State - Powell, Tubb pay producer 1 mile northeast of the Apco-Warner pool, when it flowed 83 bbl. oil and 197 bbl. water in 22 minutes through 4-in. gate choke two-thirds open. Total depth of the well is 3,557 ft., with perforations at 3,539-40 ft. and at 3,542 ft. Oil tests 22° gravity. One-half mile south extension to the one-well Heiner Ordovician pool was effected when Culbertson & Irwin 1 R. G. Heiner flowed 103 bbl. of 35.3-gravity oil on official completion gage.

WEST TEXAS COMPLETIONS

Wildcats

Belfort Oil 1 C. J. White, 1,980 ft. from S and W, Sec. 8, Blk. A-44, Public School Land, elev. 3,188 ft., Yates sand 3,190 ft., S.S.G. 3,280 ft., Grayburg lime 4,535 ft., dry, T.D. 5,019 ft.

Fields

Abell, Pecos County: George T. Abell 1 Heagy est., 330 ft. from NE, 330 ft. from SE, Sec. 9, Blk. 3, H.&T.C.R.R. Sur., elev. 2,396 ft., flow 221 bbl., 42.8 gravity, pay 5,383 ft., perf. 23 shots 5,386-91 ft., T.D. 5,416 ft.

Abell Permian, Pecos County: George T. Abell O. W. Williams, 330 ft. from S and W, Lot 12, Sec. 15, Blk. 2, H.&T.C. R.R. Sur., elev. 2,368 ft., flow 41 bbl., pay 2,288 ft., acid 4,000 gal., T.D. 2,306 ft.

Apco-Warner, Pecos County: Humble Oil & Ref. 2 D. B. Gregg, 1,980 ft. from NW, 2,020 ft. from SW, Sec. 101, Blk. 10, H.&G.N.R.R. Sur., flow 210 bbl., 42 gravity, lime pay 4,708 ft., perf. 105 shots 4,705-40 ft., acid 1,500 gal., T.D. 4,763 ft.

Barnhart, Reagan County: Skelly Oil 1-L University, SE NW Sec. 4, Blk. 48, University Sur., elev. 2,775 ft., flow 2,423 bbl., perf. 218 shots 9,120-75 ft., acid 5,000 gal., T.D. 9,220 ft.

Embar-Permian, Andrews County: Phillips Pet. 34 University, 1,980 ft. from S and W, Sec. 31, Blk. 10, University Sur., elev. 3,234 ft., flow 238 bbl., Clear Fork lime pay 6,117 ft., acid 1,000 gal., T.D. 6,628 ft.

Heiner, Pecos County: Culbertson & Irwin 1 R. G. Heiner, 1,980 ft. from S and W, Sec. 589, G.C.&S.F.R.R. Sur., elev. 2,559 ft., flow 103 bbl., lime pay 5,400 ft., acid 6,000 gal., T.D. 5,506 ft.

Sharon Ridge, Scurry County: Magnolia Pet. 6 W. R. Sterling, 660 ft. from N and E, Sec. 130, Blk. 97, H.&T.C.R.R. Sur., pump 99 bbl., 31 gravity, pay 2,195 ft., acid 1,000 gal., T.D. 2,443 ft.

Shipley, Ward County: James H. Snowden et al 1-C Wristen Bros., 1,000 ft. from SE, 330 ft. from SW, Sec. 19, Blk. 5, H.&T.C.R.R. Sur., elev. 2,489 ft., I.P. 48 bbl., pay 2,545 ft., T.D. 3,059 ft.

Slaughter, Cochran County: J. C. Hawkins 42-A Mallett, 580 ft. from N and W, Lab. 15, Lge. 47, Edwards County School Land, elev. 3,633 ft., flow 566 bbl., lime pay 4,880 ft., acid 12,000 gal., T.D. 4,945 ft.

Devonian Oil 22-B R. F. Duggan, 510 ft. from S and W, Lab. 22, Lge. 55, Oldham County School Land, flow 895 bbl., lime pay 5,030 ft., acid 12,000 gal., T.D. 5,058 ft.

Slaughter, Hockley County: J. C. Hawkins 39-A Mallett, 580 ft. from S and E, Lab. 19, Lge. 47, Edwards County School Land, flow 836 bbl., lime pay 4,925 ft., acid 11,500 gal., T.D. 4,998 ft.

Stinnett, Lubbock County: Stanolind Oil & Gas 1 Guy Hester, 660 ft. from N and W, Lab. 4, Lge. 12, San Augustine County School Land, elev. 3,132 ft., dry, T.D. 4,838 ft.

Taylor-Link, Pecos County: J. D. Lancaster 3 University, 1,650 ft. from N and E, Sec. 32, Blk. 16, University Sur., elev. 2,538 ft., flow 182 bbl., lime pay 1,407 ft., acid 1,500 gal., T.D. 1,410 ft.

Tobarg, Pecos County: Cardinal Oil 50-F Tippett, 4,249 ft. from N'ly N, 150 ft. from E'ly W, Sec. 61, Blk. 194, G.C.& S.F.R.R. Sur., elev. 2,296 ft., pump 45 bbl., 6 bbl., water, sand pay 335 ft., perf. 331-34 ft., T.D. 355 ft.

Weiner, Winkler County: Sharp Drlg. 2 S. M. Halley-Sun, 1,650 ft. from S, 990 ft. from W, Sec. 4, Blk. B-11, Public School Land, elev. 2,796 ft., flow 210 bbl., sand pay 3,017 ft., shot 170 qt., T.D. 3,098 ft.

Old Well Drilled Deeper

Keystone, Winkler County: Sid Richardson 4 Conoco-Jenkins, 1,100 ft. from S and W, Sec. 14, Blk. 77, Public School Land, new I.P. 62 bbl., shot 300 qt. 3,360-3,474 ft., old T.D. 3,365 ft., new T.D. 3,474 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—C. T. McLaughlin 1 State, NW NE 7-17s-32e, Lea County, 2 miles north of the Maljamar pool east extension, indicated a new producing spot for the area when it filled with oil from Grayburg lime topped at 3,995 ft. The hole was carried to total depth 4,170 ft., where gas blew the tools up in the hole, and oil started spraying while crew was jarring on tools. In 36 hours the hole was completely filled with oil. Storage is being erected while the well is shut in with tools still in the hole.

SOUTHEAST NEW MEXICO COMPLETIONS

Fields

Grayburg-Jackson, Eddy County: Nash, Windfohr & Brown 8-B Jackson, 1,980 ft. from N, 660 ft. from W, 25-17s-30e, flow 225 bbl., pay 3,230 ft., shot 100 qt. 3,220-68 ft., T.D. 3,268 ft.

Loco Hills, Eddy County: Western Prod. 7-C Keely, SW SW 25-17s-29e, flow 760 bbl., lime pay 2,940 ft., T.D. 3,104 ft.

Maljamar, Lea County: Johney Cockburn 17-B Pearl Miller, NW SW 25-17s-32e, flow 175 bbl., lime pay 4,000 ft., shot 280 qt., T.D. 4,200 ft.

Red Lakes, Eddy County: Fred Brainard 1-B Brainard, 330 ft. from E. 1,650 ft. from S, 6-18s-27e, pump 16 bbl., sand pay 1,791 ft., shot 60 qt., acid 4,000 gal., T.D. 1,817 ft.

Rhodes, Lea County: Texas Co. 3-B Rhodes, NE SE 28-26s-37e, flow 290 bbl., pay 3,288 ft., shot 60 qt., T.D. 3,300 ft.

PANHANDLE COMPLETIONS

Carson County: Navajo Prod. 2 E. S. Poling est., 1,320 ft. from S, 1,320 ft. from W, Sec. 24, Blk. Y-2, T.T.R.R. Sur., I.P. 30,000,000 cu. ft. gas, pay 2,350-2,460 ft., acid 7,000 gal., T.D. 2,617 ft.

Hutchinson County: Phillips Pet. 2 Neil, 1,550 ft. from S, 400 ft. from W, Sec. 68, Blk. 46, H.&T.C.R.R. Sur., elev. 2,769 ft., I.P. 174 bbl., pay 2,679 ft., P.B. to 2,729 ft.

Shamrock Oil & Gas 8 Stewart, 1,980 ft. from N, 660 ft. from W, 3,300 ft. from S, Sec. 19, Blk. M-16, A.B.&M. Sur., elev. 3,327 ft., flow 1,027 ft., pay 3,161 ft., T.D. 3,168 ft.

Skelly Oil 3 Crosby-Hatcher, 3,089 ft. from N, 330 ft. from W, Sec. 3, Blk. M-24, T.C.R.R. Sur., pump 162 bbl., dolomite pay 3,265 ft., P.B. to 3,281 ft. from T.D. 3,287 ft.

EASTERN TEXAS

Deep Wildcat Staked in Marion County

DALLAS, Tex.—Twelve miles northwest of Jefferson, in the Mims Chapel area, Gulf Oil Corp. 1 Witt, L. Rufty Survey, will be a deep test to test the basal Trinity zones. For some time East Texas operators have been watching this area, as the company has been adding to its block and curing titles. It will be the deepest test ever drilled in this county.

Jackson & Fisher 1 McCarley, wildcat northeast of Quitman, in H. Anderson Survey, which created a great deal of excitement a few weeks ago when it promised to open a new Woodbine sand pool, was drilled into Paluxy, topped at 7,275 ft., with no encouragement, and it was thought that the test would be plugged back to the Woodbine sand zone and an effort made to complete successfully. Same operators are drilling on a Woodbine test 1 mile east of the above test, the No. 1 First National Bank of Quitman, in the Jane Duncan Survey.

EAST TEXAS COMPLETIONS

Fields

Hawkins, Wood County: Humble Oil & Ref. 5 J. C. Snow, 2,200 ft. from N, 2,013 ft. from W, J. B. Crain Sur., pump 131 bbl., perf. 4,742-4,836 ft., T.D. 4,698 ft.

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LOUISIANA GULF

Reddell Prospect Reports Shows in Lower Wilcox

NEW ORLEANS, La. — Attention still was turned this week toward Danciger Oil & Refining Co.'s wildcat in Evangeline Parish, the 1 Hattie Haas, 22-4s-1w, in the Reddell area, where another oil show was reported to have been logged in the Wilcox formation. After reaching the contract depth, 10,500 ft., it was decided to carry the hole farther, and this wildcat, which at latest report was coring at 11,053 ft. in sandy shale, was said to have logged a sand showing oil and gas at 10,947-88 ft. It had reported shows in the upper Wilcox. No information was available as to how far the hole would be carried.

Terrebonne Parish. — Testing continued at Union Producing Co. 1 Fitzpatrick & Vizard, in the De Large area, which has been giving promise of establishing a new world record for deep production. On a drill-stem test through perforations at 13,475-90 ft. this well flowed gas and distillate, with working pressure of 635 lb. and no salt water. Operator ran 3½-in. tubing and sealed in casing with packer. When swabbed to 3,800 ft. the well flowed salt water. The well was killed. Without performing a squeeze job preparations were begun for a drill-stem test in an effort to determine where the salt water comes from. Union Oil Co. of California was drilling at 9,386 ft. in shale at 1 Calvert & Todd, a mile north of Houma.

Vernon Parish. — M. S. Smith 1 Nona Mills Co., 31-3n-11w, temporarily abandoned in August 1942 at 360 ft. in gumbo, has been temporarily abandoned again after resumption of drilling had carried the hole to 4,515 ft.

Cameron Parish.—Continental et al 1 Adolph Hebert, Jr., Big Lake area wildcat, was bottomed at 9,500 ft. and ran an electrical survey to total depth. At latest report it was waiting for cement to set after running 9⅝-in. casing at 9,500 ft.

LOUISIANA GULF COAST COMPLETIONS

Wildcats

Beauregard Parish: American Republics Corp. 2-X Lutcher-Moore Lumber Co., 34-5s-13w, dry 7,060 ft.

Fields

Bayou Couba, St. Charles Parish: Gulf 10 Delta Securities Co., 18-15s-22e, dry at 6,459 ft.

Bayou des Allemands, St. Charles Parish: Amerada et al 2 T. D. Sellers, O.W.W.O., old P.B. T.D. 9,991 ft., new P.B. T.D. 9,984 ft., 178 bbl. through ⅛-in. choke, T.P. 1,500 lb., gas-oil ratio 943, perf. 9,978-82 ft.

Bayou Sale, St. Mary Parish: Texas 4 State-East Cote Blanch Bay, Bay-16s-9e, 280 bbl. through 9/64-in. choke, T.P. 1,825 lb., gas-oil ratio 1,040, perf. 10,135-45 ft., T.D. 10,160 ft., P.B. 10,150 ft.

Chacahoula, LaFourche Parish: Sun 4-A Dibert, Stark & Brown Cypress Co., 72-15s-15e, dry at 1,139 ft.

Charenton, St. Mary Parish: Pan American 24 Laws Realty Co., 30-13s-10e, 6,000,000 cu. ft. gas, with spray of distillate, through 10/64-in. choke, T.P. 2,350 lb., perf. 6,283-6,304 ft., T.D. 7,122 ft., P.B. 6,305 ft., well shut in.

Dog Lake, Terrebonne Parish: Texas 17 L.L.&E.-Dog Lake, 5-22s-16e, dry at 9,539 ft.

Eola, Avoyelles Parish: Gulf-Tide Water 2 M. F. Mouliere, 1-2s-2e, O.W.W.O., old T.D. 8,754 ft., new P.B. T.D. 7,520 ft., 233 bbl. through 5/32-in. choke, T.P. 1,350 lb., gas-oil ratio 1,330, perf. 7,494-7,500 ft.

Four Isle, Terrebonne Parish: Duval Texas Sulphur Co., 23-21s-16e, dry at 1,920 ft.

Jennings, Acadia Parish: Stanolind 124 Crowley Oil & Mineral Co., 48-9s-2w, dry at 7,344 ft.

Little Bayou, Iberia Parish: William Helis 15 J. E. Schwing, 56-12s-7e, dry at 4,067 ft.

Neale, Beauregard Parish: Atlantic 1-G Rice Land & Lumber Co., 34-3s-11w, 211 bbl. through 11/64-in. choke, T.P. 1,650 lb., gas-oil ratio 2,843, perf. 10,950-68 ft., T.D. 11,785 ft., P.B. 11,426 ft.

Paradis, St. Charles Parish: Humble 10 Manufacturers Record Publishing Co., 40-14s-20e, 957 bbl. (based on 2-hr. gage) through ⅞-in. choke, T.P. 1,700 lb., gas-oil ratio 861, perf. 10,210-15 ft., T.D. 10,215 ft.

Texas 1 Laughlin, 39-14s-20e, 273 bbl. through 9/64-in. choke, T.P. 1,552 ft., gas-oil ratio 645, perf. 10,378-83 ft., T.D. 10,390 ft., P.B. 10,372 ft.

Pine Prairie, Evangeline Parish: Gulf 1-C Schlicher-Thomas Co., 1-4s-4w, 240 bbl. through 5/32-in. choke, T.P. 800 lb., gas-oil ratio 988, perf. 9,079-88 ft., T.D. 9,193 ft., P.B. 9,095 ft.

St. James, St. James Parish: Humble 1 F. A. Graugnard & Sons, 85-12s-16e, dry at 10,936 ft.

Vinton, Calcasieu Parish: Union Oil Co. of California 1-M J. G. Gray estate, 33-10s-12w, 165 bbl. through ⅛-in. choke, T.P. 910 lb., C.P. 930 lb., gas-oil ratio 517, perf. 5,826-56 ft., T.D. 6,055 ft., P.B. 5,851 ft.

TEXAS GULF COAST

Wildcat Staked on Flank Of Blue Ridge Dome

HOUSTON, Tex.—Fort Bend County, already the scene of active wildcatting operations, saw an addition last week, when Phillips Petroleum Co. staked location for its 3 E. R. Robinson on the southwest flank of the Blue Ridge dome. It is about midway between the two dry holes drilled there, in the H. Shropshire Survey. O. W. Killam Co.'s 1 J. R. Nesbitt, 1½ miles northwest of Fulshear, in the Rufus Wright Survey, was drilling in shale at 5,100 ft. The 1 E. C. Burney estate, closely watched wildcat test of Ray Ranger and Jack W. Frazier, 3½ miles southwest of Katy, was drilling in shale below 7,230 ft. Oil odors are reported to have been tested at higher levels.

Chambers County. — Butcher-Arthur, Inc., 1 Olive Sherman et al, 3½ miles northeast of Wallisville, is a new wildcat location. Wynn Crosby et al 1 J. E. Jackson, 15 miles south of Anahuac, was awaiting a potential test. This discovery well, drilled to total depth of 9,512 ft., flowed at the rate of 235,000 cu. ft. of gas, with 3½ bbl. of distillate per hour, on a 1-hour test through ⅛-in. choke. Tubing pressure was 2,850 lb. and shut-in casing pressure 2,915 ft.

Jackson County.—George W. Strake 1 J. M. Bennett, 1½ miles southwest of La Salle, was preparing to core from 5,035 ft. in sandy shale. It topped the Discorbis at 5,520 ft. Morris Wommack et al 1 Frank Sheblock, 2 miles southwest of the Mustang Creek field, was at total depth of 7,012 ft. in shale, with no shows.

Jefferson County.—Humble Oil & Refining Co. and Shell Oil Co., Inc., 1-C McFaddin Trust, 5 miles southeast of La Belle field, was drilling at 10,332 ft. in shale, with streaks of lime. Glenn H. McCarthy, Inc., et al 1 Hebert Trust, 4 miles southwest of Viterbo, at total depth of 10,092 ft., was washing over and backing off 3-in. drill stem. This wildcat suffered a costly blowout last May. Texas Co. 1 J. E. Broussard et al, 7 miles southeast of Nome, was coring at 7,860 ft. in hard sand and shale. Slight oil odors are reported to have been the only encouragement thus far.

Montgomery County.—Gar-Flo and R. E. Hanrick are rigging up for a wildcat test, 1 Calfee and Longmire, 4 miles northwest of Conroe. Humble 1-B Texas Long Leaf Lumber Co. et al, 1½ miles northwest of Splendora, was drilling at 7,030 ft. in shale. It cored the Cockfield section with no shows reported.

Washington County.—Champlin Refining Co. 1 C. D. Dallmeyer, 2 miles north of Burton, was drilling at 6,400 ft. in shale. It topped the Wilcox at 4,035 ft.

Burleson County. — Slight showing of oil and gas has been reported at B. C. Burkowski, trustee, 1 C. E. Cade, Jr., 4 miles west of Caldwell. This well was drilling below 2,410 ft. in sand and shale.

TEXAS GULF COAST COMPLETIONS

Wildcats

Chambers County: Arkansas Fuel Oil Co. 1 Annie Frankland, R. C. Frankland Sur., A-331, dry at 10,103 ft.

Matagorda County: Boyle Oil Corp. 1 Guy Stovall, I.&G.N. Sur., dry at 6,510 ft.

Fields

Collier, Jackson County: Texas 5 Bolling-Collier, James Kerr Sur., A-39, 33 bbl. through 6/64-in. choke, T.P. 110 lb., C.P. 675 lb., gas-oil ratio 160, perf. 2,147-25 ft., T.D. 2,470 ft., P.B. 2,448 ft.

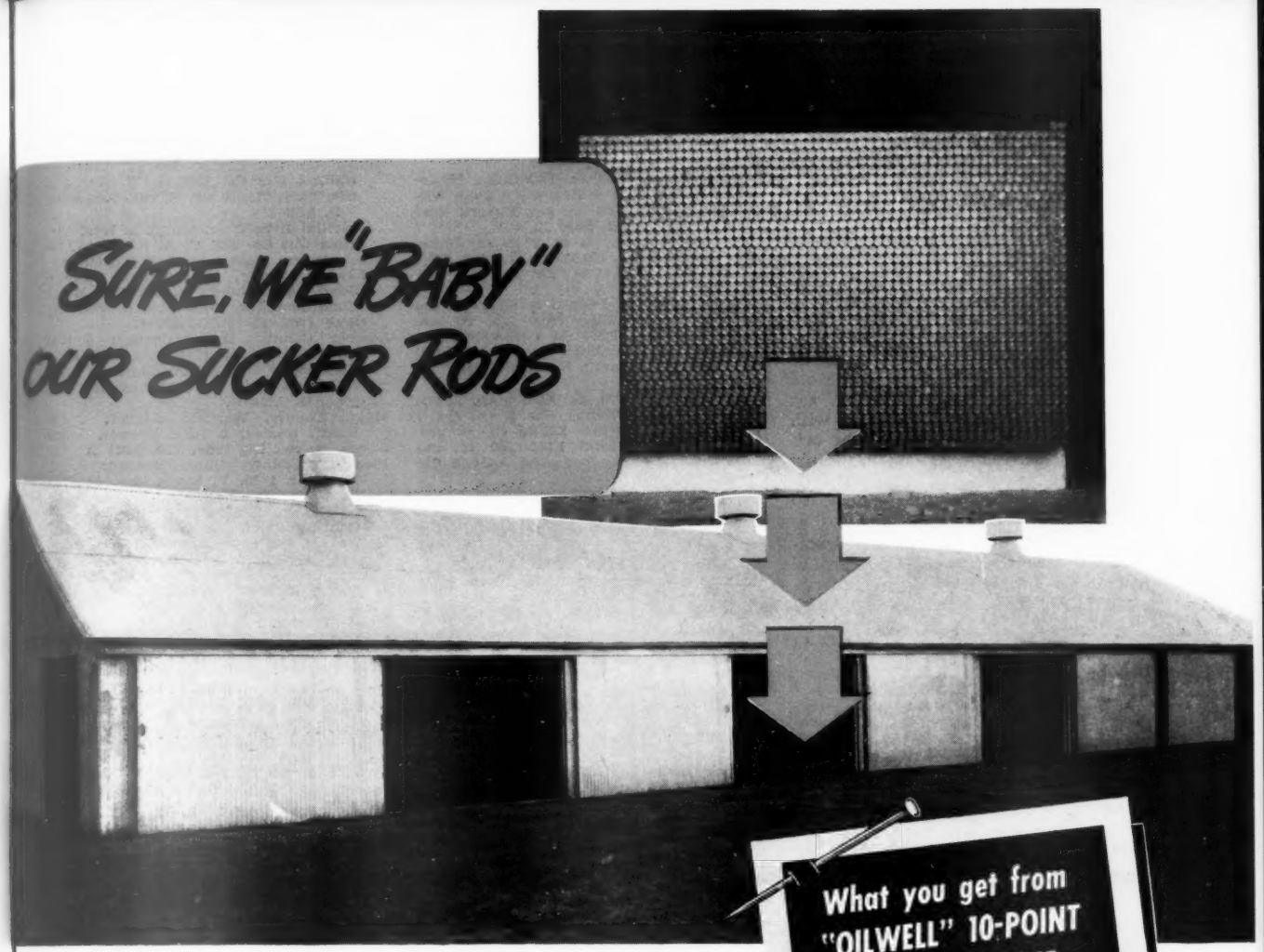
Sun 1 William Classen, James Kerr Sur., A-39, dry at 2,605 ft.

Dickinson, Galveston County: Humble 3 E. E. Townes, J. S. Jones Sur., A-129, O.W.W.O., 444 bbl. through ¼-in. by 6-in. chokes, T.P. 625 lb., gas-oil ratio 931, perf. 8,546-50 ft., old T.D. 8,045 ft., new P.B. T.D. 8,583 ft.

Esperson, Liberty County: General Crude 4-A R.A. Welch fee, M. Duncan Sur., A-29, 302 bbl. through ¼-in. choke, T.P. 2,300 lb., S.I. C.P. 2,700 lb., gas-oil ratio 336; perf. 7,510-20 ft., 7,540-50 ft., 7,555-65 ft., 7,585-95 ft., T.D. 8,550 ft., P.B. 7,800 ft.

Ganado, Jackson County: Humble 6 M.

(Continued on Page 108)



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APPALACHIAN FIELDS

Chestnut Ridge Test Nears Objective in Oriskany

PITTSBURGH, Pa. — On Chestnut Ridge in South Union Township, Fayette County, Pennsylvania, Peoples Natural Gas Co. reached 7,805 ft. in 1 Walters after redrilling the Marcellus section and placed the top of the Onondaga chert at 7,656 ft. in the new hole, against 7,660 ft. in the old hole. So far there has been no gas from the chert beds compared with over 200,000 cu. ft. of gas in the orinal hole at 7,791 ft. The gas in the old hole was 131 ft. in the Onondaga chert compared with the present 144 ft. in the chert.

Beaver County. — In Ohio Township, Beaver County, South Penn Oil Co. is drilling at 4,050 ft. in the Oriskany test on the Cunningham-Vlatovich unit. So far there have been no gas pockets but they are expected in the next few hundred feet.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Cowanshannock Township: T. W. Phillips Gas & Oil Co. 1 R & P Coal Co., 103,000 cu. ft. gas, through Bradford sand, T.D. 3,495 ft.

Allegheny County, Plum Township: Equitable Gas Co. 3292 Susanna Davidson, 348,000 cu. ft. gas, Thirty-foot sand, 2,065-68 ft., T.D. 2,116 ft.

Fayette County, German Township: Duquesne Gas Co. 2 J. N. Ross, 385,000 cu. ft. gas, Big Injun 1,317 ft., T.D. 1,335 ft.

Nicholson Township: Barnesville Development Co. 1 T. J. McLarinan, 325,000 cu. ft. gas, Big Injun 1,384, 1,465, and 1,522 ft., T.D. 1,630 ft.

Greene County, Center Township: Manufacturers Light & Heat Co. 1 John Wilkinson, 40,000 cu. ft. gas, Bayard sand 3,328-32 ft., T.D. 3,350 ft.

Manufacturers L. & H. 2 Sarah Smith, drilled deeper, 120,000 cu. ft. gas, Bayard sand 3,356-88 ft., gas 3,381 ft., T.D. 3,406 ft.

Perry Township: Peoples Natural Gas Co. 1 Pauline Phillips, 65,000 cu. ft. gas, Bayard stray 3,314 ft., T.D. 3,518 ft.

Washington Township: Carnegie Natural Gas Co. 1 Neonetta H. Martin, dry, T.D. 3,202 ft.

Indiana County, South Mahoning Township: T. W. Phillips Gas & Oil Co. 1 B. & S. Coal Co., 270,000 cu. ft. gas, Hundred-foot sand 1,191-1,300 ft., gas 1,196 ft., Thirty-foot sand 1,418-28 ft., T.D. 1,578 ft.

Westmoreland County, Bell Township: Kiski Valley Gas Co. 1 Robert Martin, 421,000 cu. ft. gas, Speechley sand 3,076-81 ft., T.D. 3,159 ft.

WEST VIRGINIA COMPLETIONS

Calhoun County, Center district: Hope Natural Gas Co. 5886 Philander Propst, 179,000 cu. ft. gas, Big Injun sand, T.D. 2,000 ft.

Sherman district: Hope Natural Gas Co. 8639 Mary Cox, 327,000 cu. ft. gas, Maxton sand, T.D. 1,899 ft.

Clay County, Buffalo district: Pittsburgh & West Virginia Gas Co. 7913 Elk River C. & L. Co., 450,000 cu. ft. gas, Salt sand, T.D. 1,683 ft.

Pittsburgh & West Virginia Gas Co. 7917 Elk River C. & L. Co., 590,000 cu. ft. gas, Big Injun sand, T.D. 1,761 ft.

Otter district: Howard Bartlett 2 Ernest A. Boggs, 184,000 cu. ft. gas, Big Injun sand, T.D. 1,864 ft.

Union district: Laurel Producing Co. 6 Bodo Otto, 4 bbl., Dunkard sand, T.D. 535 ft.

Pleasant district: Godfrey L. Cabot, Inc., 3 C. & H. Corp., 5,840,000 cu. ft. gas, Big lime, T.D. 1,752 ft.

Gilmer County, Center district: Carnegie Natural Gas Co. 1582 G. W. Neely & Ella Furr, 671,000 cu. ft. gas, Salt sand, T.D. 1,540 ft.

Glenville district: Pittsburgh & West Virginia Gas Co. 7951 C. A. Rollins, 73,200 cu. ft. gas, Squaw sand, T.D. 1,915 ft.

Kanawha County, Washington district: South Penn Natural Gas Co. 12 Black Band Fuel Co., 267,000 cu. ft. gas, Big lime 1,655 ft., T.D. 1,860 ft.

Lincoln County, Duval district: United Fuel Gas Co. 5202 Horse Creek C. & L. Co., 280,000 cu. ft. gas, Big lime 1,474 ft., Injun 1,696 ft., brown shale 3,340 ft., T.D. 3,796 ft.

Mingo County, Warfield district: C. S. Black, trustee, 2 John Brewer, 14,900 cu. ft. gas, Big lime, T.D. 1,921 ft.

Pleasants County, Union district: J. C. Ruckman 1 M. V. Smith, dry, Maxton sand 1,621 ft., Big lime 1,666 ft., Injun 1,773 ft., T.D. 1,960 ft.

Putnam County, Curry district: Humphrey Gas Co. 1 E. D. Humphrey 103,000 cu. ft. gas, Berea, T.D. 2,343 ft.

Upshur County, Banks district: Hanley & Bird 1 K. G. Wilson 133,400 cu. ft. gas, Benson sand, T.D. 3,800 ft.

Meade district: Pittsburgh & West Virginia Gas Co. 7956 L. E. Smith, 187,700 cu. ft. gas, Gordon sand, T.D. 4,300 ft.

Wirt County, Burning Springs district: W. C. Patterson 7 D. A. Ruley, 3½ bbl., Cow Run sand, T.D. 510 ft.

ORISKANY GAS FIELDS

Jackson County, Ripley district: United Fuel Gas Co. 5215 D. C. Shamblen, 3,558,000 cu. ft. gas, Oriskany 5,160 ft., shot 5,164-96 ft., T.D. 5,208 ft.

Kanawha County, Union district: Cameron Producing Co. 1 A. T. Bonham, 275,000 cu. ft. gas from shales and Oriskany sand, Oriskany 4,770 ft., T.D. 4,774 ft.

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KANSAS

Barton County Wildcat Is Small Pumper in Lansing

A NEW Lansing-Kansas City lime pool was opened in Barton County, 1½ miles southwest of the Roesler Arbuckle discovery. The well, Ingling & Parker and Ed Jones 1 Ames, SE SW SE 22-18s-11w, is producing from plugged-back depth of 3,049 ft. Top of the lime was 3,023 ft. Total depth was 3,329 ft. in the Arbuckle dolomite, which yielded only a show of oil. After the first acid treatment it flowed 35 bbl. of oil in 1 hour. It was then acidized with 1,000 gal. and swabbed 26 bbl. of oil. There is no water with the oil and it tested 46 gravity.

Location is 4 miles south of the town of Claflin. Jones owns 2,320 acres around the well and Ingling & Parker have the south and west offset 80 acres. The Ames well is about midway between the Roesler and Feist pools and may open the intervening acreage for further testing. Production at Feist is also high gravity in the Arbuckle at an average depth of 3,450 ft.

KANSAS COMPLETIONS

Wildcats

Cowley County: Elmer Adams 1-A McKnab, NE NE SW 35-31-4e, dry, T.D. 2,956 ft., Layton 2,262 ft., Bartlesville 2,913 ft., Mississippian chat 2,956 ft., show oil 2,280 ft.

Ellis County: Appleman and Harbar Drlg. 1 Richards ranch, SE SE SE 19-11-18w, filled 2,800 ft. with oil and pumped 432 bbl. in 24 hr., 27.5 gravity, Arbuckle 3,611-19 ft.

Phillips and Continental 1 John Hancock, NE NE NE 17-11-18w, dry, T.D. 3,576 ft., Lansing 3,186 ft., Simpson 3,514 ft., Arbuckle 3,546 ft.

McPherson County: Helmerich & Payne and Auto-Ordnance 1 Kumli, W¼ NW NW 6-18-5w, dry, T.D. 3,888 ft., Misener 3,658 ft., Viola 3,682 ft., Simpson sand 3,756 ft., shale 3,765 ft., Arbuckle 3,817 ft.

Russell County: Nadel & Gussman 1 Sebesta, SW SE 36-15-11w, dry, T.D. 3,353 ft., Lansing 2,976 ft., Arbuckle 3,323 ft., show oil.

Saline County: Chas. M. Coats 1 Applequist, SW SE 5-16-3w, dry, T.D. 3,597 ft., Viola 3,361 ft., Simpson sand 3,505 ft., Arbuckle 3,581 ft., slight show oil 3,507 ft.

Fields

Ainsworth, Barton County: Black-Marshall 1 Ainsworth, SE SE NW 33-16-13w, pumped 86 bbl., Arbuckle 3,423-31 ft.

Carmi, Pratt County: Shell 2 Schwartfeger, SW SE SW 30-26-12w, flowed 142 bbl. in 3 hr., Arbuckle 4,291-4,323 ft.

Chase, Rice County: Cities Service 4-A McGlynn, NW SE 17-20-9w, pumped 282 bbl., Arbuckle 3,300-13 ft.

Cunningham, Pratt County: Gulf Oil Corp. 2 Bucklin, SW NE 11-28-11w, pumped 5 bbl. oil and 430,000 cu. ft. gas, Viola 4,269-88 ft.

Davidson, Russell County: Texas Co. 2 Borrell, SE NW 33-15-11w, pumped 142 bbl., Arbuckle 3,275-80 ft.

Frog Hollow, Cowley County: Ingling & Parker 1-A Miller, NW SW 16-32-5e, 3,000,000 cu. ft. gas, Layton sand 2,373-78 ft., T.D. 2,415 ft., 600-lb. casing pressure.

Hunter, Saline County: Deep Rock 1 Hunter, NE NE SW 20-16-1w, pumped 458 bbl., Mississippian chat 2,669-78 ft.

Kraft-Prusa, Barton County: Magnolia 3-A Grossardt, SW NW 9-17-11w, pumped 60 bbl., Arbuckle 3,280-96 ft.

Gulf 3 Kroutwurst, SW SE 9-17-11w, dry, T.D. 3,318 ft., Arbuckle 3,310 ft.

Derby Oil 7 Frees, NE NE 3-17-11w, swabbed 69 bbl. in 12 hr., Arbuckle 3,369-71 ft.

Lindsborg, McPherson County: Texon 2 Graslie, NW SE 5-17-3w, pumped 365 bbl., Simpson 3,469-76 ft.

Texas Co. 3 Helander, W½ NE NE 36-17-4w, pumped 518 bbl., Viola 3,378-92 ft.

Texas Co. 2 Helander, W½ NW SW 36-17-4w, pumped 464 bbl., Viola 3,384-91 ft.

Lost Springs, Marion County: Nadel & Gussman 1 Bernhardt, NE SE 16-17-4e, dry, T.D. 2,432 ft., swabbed 10 bbl. oil and 300 bbl. water, chat 2,356 ft.

Derby Oil et al 2 Rogers, E½ SE SE 9-17-4e, pumped 100 bbl., chat 2,353-76 ft.

Marion County: Ring-Mac Oil 1 Vinduska, E½ SE NW 5-18-4e, dry, T.D. 2,439 ft., Mississippian chat 2,405 ft.

Marshall, Ellis County: Amerada and Republic 4 Hadley, N½ NE NE 31-11-17w, pumped 25 bbl., Arbuckle 3,521-52 ft., T.D. 3,558 ft.

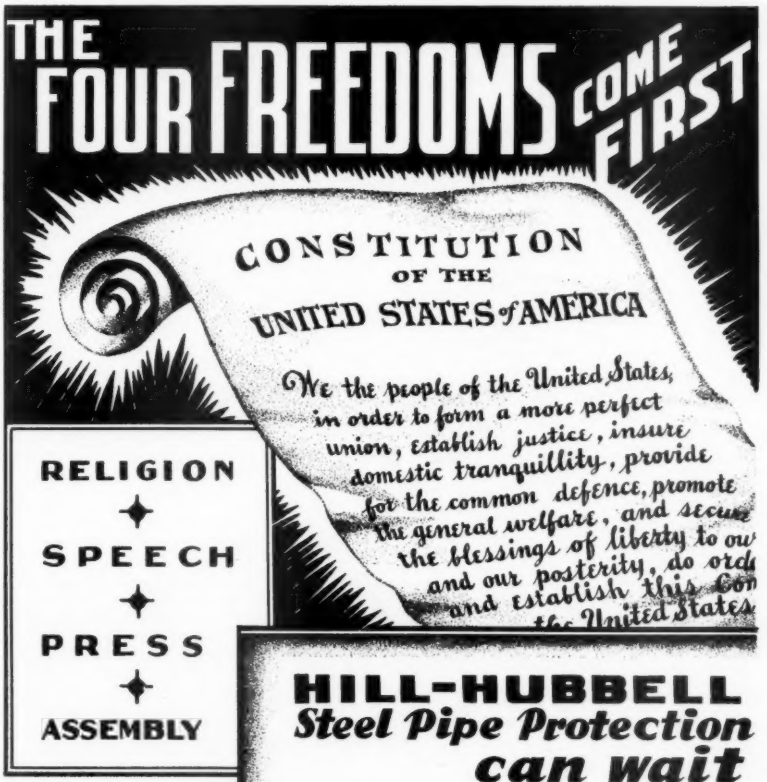
Odin, Barton County: Darby Pet. 1 Pearson, NW NW NW 11-17-13w, dry, T.D. 3,398 ft., Arbuckle 3,371 ft.

Ray, Phillips County: Cities Service 2-B Wallgren, SW SW NW 29-5-20w, potential 695 bbl., Arbuckle 3,598-3,602 ft., T.D. 3,669 ft.

Roxbury, McPherson County: Shallow Water 1 Boyd, S½ SE SW 20-17-1w, pumped 66 bbl., Mississippian chat 2,658-76 ft.

Stucky, Harvey County: Lazard Bros. 1 Siemans, NW NW 2-23-3w, 5,000,000 cu. ft.

(Continued on Page 122)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CANADIAN FIELDS

Oil Showing in Test of Athabaska Area

CHATHAM, Ont.—In the Athabaska field, north of Edmonton, Deca 2, LSD 3, 16-66-23w4, encountered oil at 1,655 ft., the first 8 ft. of core in the Grand Rapids sandstone showing heavy oil saturation. Coring was continued to 1,671 ft. Casing is being cemented for a production test. The well logged closely with Athadome 2, a mile to the west, which got a 50-ft. oil sand at 1,651 ft. Location is being made for a second well, which will be drilled about 6 miles east of Deca 2 and within 300 yd. of the Alaska Highway and the Canadian National Railway, both of which traverse the 54,000 acres of leases held by East Crest Oil Co. and Davies Petroleums, which sponsored the drilling. A heavy drilling outfit is being moved in for the second test.

Bruderheim. — On the Bruderheim structure, 27 miles northeast of Edmonton, Clonmel Petroleums of Toronto is preparing to drill a second test this year. Clonmel 1, drilled last year, failed to get commercial production, but a study of the log indicates possibilities of commercial oil on another location. The company is also making application to Wartime Oils for assistance in completing Northclonmel 1, in the North Turner Valley extension, which is standing at 8,850 ft. with a fair production from the upper horizon of the Madison limestone, but has not been carried to the lower lime.

Ram River. — Extensive leasing is taking place in the Ram River-Clearwater area in the northern Alberta foothills west of Rocky Mountain House, where Ram River Oils 2, LSD 8, 1-37-11w5, is testing oil showings encountered in the Devonian limestone. Last month, Imperial Oil interests secured a permit covering 298,000 acres surrounding the central Ram River holdings to the west, north and east. Anglo-Canadian Oil Co. has leased some 20,000 acres to the south, in Townships 33 and 34, Ranges 7 to 9w5, close to Bearberry, where the company drilled a well on Clearwater River. Ram River Oils and associated interests have taken up an additional 20,000 acres in Townships 36 and 37, Ranges 11 and 12w5.

Jumping Pound. — In the Jumping Pound area, west of Calgary, Shell Exploration-Norman 1, LSD 5, 22-24-5w5, has established a new deep drilling record for Canada, being now below 10,332 ft. At this depth it is still in the Blairmore formation. Drilling may be continued to 12,000 ft. The previous depth record for Canada was held by Okalta Oils 6, on the west flank of South Turner Valley, which discontinued drilling at 10,120 ft. after encountering salt water in the Madison limestone.

Turner Valley completions. — Miracle Royalties 3, LSD 13, 33-20-3w5, in North Turner Valley, finished at 8,164 ft. with Madison at 7,870 ft.; initial production was 681 bbl. daily of 42.4-gravity crude. National-Vulcan 1, LSD 15, 5-21-3w5, in the north extension, finished at 8,741 ft. with Madison at 8,565 ft. and was acidized with 4,500 gal. to produce 421 bbl. daily of 39.8-gravity crude. Only the upper zone of the lime was tested.

North extension.—A further extension of Turner Valley production to the north is indicated by British Dominion 5, LSD 5, 17-21-3w5, finished at 8,598 ft. with Madison at 8,169 ft. In its first 8-hour run the well gave 1,825 bbl. and was shut in for storage. Later, a separate test of the lower zone under 400 lb. back pressure gave 130 bbl. an hour until storage was filled, a previous test of the upper zone giving 37 bbl. an hour with 750 cu. ft. gas-oil ratio. After a final 2,000-gal. acid treatment the well made 185 bbl. an hour through 7-in. casing, considerably more than the flush production of Major 3, the previous top producer. Location is ¼ mile north of Atlas-British Dominion 2 and northwest of Atlas-British Dominion 3, previously the most northerly producers.

Fort Norman. — Official figures of

(Continued on Page 122)

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NORTH CENTRAL TEXAS

Simpson and Ellenburger Show Oil in West Nocona Area

WICHITA FALLS, Tex.—Stanolind Oil & Gas Co. 1 C. A. Reed, Block 48, Belcher subdivision, Guadalupe University Survey, 3½ miles west of Nocona, topped Simpson lime at 5,720 ft., Simpson dolomite at 5,741 ft., and drilled sandy dolomite showing oil from 5,741-65 ft. A 30-minute drill-stem test from 5,742-65 ft. showed 290 ft. oil-cut mud with slight showing of gas, no water. Drilling ahead, the test topped Ellenburger at 5,765 ft., and drill-stem test from 5,730-75 ft., open 45 minutes, recovered 80 ft. drilling mud cut with oil. The test is now drilling ahead to complete 6,000-ft. contract. W. B. Omohundro 1 Mose Fowler, 6,300-ft. rotary test 5 miles southwest of Belcherville, was drilling below 5,868 ft. in hard shale. R. H. Dearing 1 Field, Section 24, J. Field Survey, 4 miles southeast of St. Jo, an 8,000-ft. test, was drilling in shale at 5,975 ft.

Archer County.—L. T. Burns 14 Ickert, Block 14, Crawford subdivision, 5 miles north of Olney, topped Mississippi lime showing oil at 5,011 ft., drilled to total depth 5,165 ft., and cemented 7-in. casing at that depth. It is planned to perforate casing opposite the shows from 5,052-48 ft.

Young County.—Anderson-Prichard Oil Corp. 1 W. T. Donnell, M. Edwards Survey, 2 miles southeast of Murray, topped Mississippi lime at 4,488 ft., and on 45-minute drill-stem test from 4,574-84 ft. recovered 25 ft. drilling mud with no shows, and was drilling ahead. Two important new wildcat tests have been staked in the county. Kerlyn Oil Co. and Phillips Petroleum Co. 1 B. W. King is located 330 ft. from north and west lines of Section 1920, T.E.&L. Survey, 1½ miles southeast of Jean, and is to be a 5,300-ft. test. Hanlon-Buchanan, Inc., and Auto-Ordnance Co. 1-F B. W. King, a new 6,000-ft. test, located 495 ft. from south and west lines of Section 461, T.E.&L. Survey. Tolbert Drilling Co. and Continental Oil Co. 1 M. K. Graham, Section 2398, T.E.&L. Survey, was acidized after perforating casing at 3,716-45 ft., plugging back after finding the Mississippi lime and Ellenburger lime dry. Deep Rock Oil Co. 1 R. L. Morrison, F. McLaurin Survey, east of Bunger, was reported showing oil from Caddo lime at total depth 3,919 ft.

NORTH TEXAS COMPLETIONS

Wildcats

Archer County: Akin & Dimock 1 C. L. Abercrombie, Blk. 30, Harris Ranch subd., dry, T.D. 1,541 ft.

Frank Buttram 1-B John F. O'Donohoe, 660 ft. from N and E, Blk. 104, A.T.N. C.L. subd., S.S.O. 3,790 ft., Caddo lime 4,749 ft., Ellenburger lime 5,049 ft., S.O. 5,049-88 ft., dry, T.D. 5,088 ft.

W. H. Peckham 1 C. L. Abercrombie, 990 ft. from E, 1,650 ft. from W, N 200 ac., S. Abercrombie Sur., dry, T.D. 1,333 ft.

Ed G. Stewart 1 F. McAnally, 467 ft. from S and E 233.1-ac. tract, W. M. Matthews Sur., dry, T.D. 3,012 ft.

Clay County: Tom B. Owens 1 Gus Blakely, 660 ft. from N and W, Blk. 79, Freestone County School Land, Marble Falls lime 6,090 ft., dry, T.D. 6,110 ft.

Cooke County: W. R. Bourland 1 J. B. Cooke est., J. Lewis Sur., dry, T.D. 1,760 ft.

Parker County: Devonian Oil 1 Raymond Buck, 660 ft. from S and E Sec. 2, Blk. 9, H.&G.N.R.R. Sur., Ellenburger 6,680 ft., dry, T.D. 7,124 ft.

Young County: Anderson-Prichard et al 1 Henry T. Mooney, J. Mooney Sur., dry, T.D. 4,807 ft.

Fields

Allar, Young County: Panhandle Ref. 2-C Allar-Hunt, 3,022 ft. from N, 495 ft. from E, S 1,185 ac., Sec. 3409, T.E.&L. Sur., flow 82 bbl., Caddo lime pay 3,575 ft., T.D. 3,585 ft.

Clay County: Jack C. Barnard 4 J. B. Hansard, G. Longardio Sur., I.P. 5 bbl., sand pay 1,127 ft., T.D. 1,130 ft.

Consolidated, Wilbarger County: Consolidated Oil 4 W. T. Waggoner est., Sec. 36, Blk. 6, H.&T.C.R.R. Sur., I.P. 29 bbl., lime pay 3,750 ft., perf. 56 shots 3,755-70 ft., P.B. to 3,785 ft. from T.D. 4,025 ft.

Fargo, Wilbarger County: W. H. Rogers, Jr., 2 A. O. Green, 440 ft. from N, 1,760 ft. from E, Sec. 32, Blk. 15, H.&T.C. R.R. Sur., pump 92 bbl., lime pay 4,570 ft., acid 2,500 gal., T.D. 4,640 ft.

Joy, Clay County: Magnolia Pet. 1 N. Ford, 660 ft. from S and W, Blk. 23, H. Williams Sur., dry, T.D. 4,208 ft.

McKeichan, Throckmorton County: T. S. Stanfield 1 W. M. McKeichan, C SW J. Becker Sur., dry, T.D. 760 ft.

Thornberry, Clay County: Bridwell Oil 17 Saner-Lomax, Blk. 118, Saner subd., dry, T.D. 1,145 ft.

Bridwell Oil 18 Saner-Lomax, Blk. 118, Saner subd., pump 64 bbl., sand pay 1,129 ft., T.D. 1,134 ft.

F. H. Gohlke 4 Ed Bunnenberg, Blk. 34, Pratt subd., dry, T.D. 1,233 ft.

F. H. Gohlke 5 Ed Bunnenberg, Blk. 34, Pratt subd., dry, T.D. 1,232 ft.

Johnson & Kouri 16 C. T. Taylor est., Blk. 56, Bacon subd., I.P. 19 bbl., sand pay 1,120 ft., T.D. 1,135 ft.

Sussex Oil 12 E. H. Hamilton, Blk. 83, Byers Bros. subd., pump 72 bbl., sand pay 1,098 ft., T.D. 1,111 ft.

Sussex Oil 5 W. J. McInnes, Blk. 57, Byers Bros. subd., dry, T.D. 1,369 ft.

Texas Co. 1 T. P. Duncan, Blk. 16, Bacon subd., dry, T.D. 1,400 ft.

Walnut Bend, Cooke County: Sinclair Prairie Oil 1 R. W. Brown, 330 ft. from N and E, Blk. 67, Fannin County School Land, flow 950 bbl., Winger sand pay 5,443 ft., T.D. 5,523 ft.

Wichita County: W. A. Baber 1 H. G. Karrenbrock, J. Aldridge Sur., dry, T.D. 671 ft.

Bell Oil & Gas 6-B W. T. Cropper, 850 ft. from S, 1,240 ft. from W, 80-ac. lease, C. Winters Sur., pump 113 bbl., pay 1,380 ft., T.D. 1,385 ft.

Ernest Prod. 3-A F. P. Warren, W. J. Smith Sur., pump 7 bbl., pay 581 ft., T.D. 590 ft.

(Continued on Page 111)

SOUTHWEST TEXAS

Four Wildcats Under Way in Willacy County

CORPUS CHRISTI, Tex.—With five operations under way, four of them wildcat, Willacy County has become an area of lively interest. The newest wildcat location staked is that of Carl I. Olsen 1 W. Lincoln, 8½ miles southeast of the Willamar field. Baldridge & King will drill 1 J. C. Cavazos, 6 miles southeast of Willamar. This test is supported by Standard Oil Co. of Texas and Pan American Production Co., both of which have done prospecting in the Willacy region. Upon completion of 1 Cavazos, it is reported the rig will be moved to a location 5 miles northeast of Yturria, where Texas will drill 1 Yturria Land & Livestock Co. A mile east of Raymondsville Sinclair Prairie Oil Co. has staked location for 1 C. E. Wertz, in the San Juan de Carricitos Survey. In the Willamar field Pan American started work last week on 1 Marta Garcia de Rodriguez, in the San Juan de Carricitos Survey. The test is slated to go to 8,200 ft.

Starr County.—T. E. Stephens 1 Gonzales heirs, 10 miles north of Roma, which had been shut down several weeks waiting for orders, is undergoing a workover job. Oil showings had been reported at this wildcat, drilled to total depth of 5,378 ft. and plugged back to 4,263 ft. The perforations at 4,161-65 ft. were squeezed, and at latest report preparations were being made to reperforate. Sun Oil Co. 2-A F. Alvarado, 5 miles north of the Rincon field, was drilling in shale at 7,453 ft. A drill-stem test at 7,358-7,419 ft. through ¼-in. chokes at top and bottom recovered 1,550 ft. of drilling mud and showed 1 lb. pressure.

Jim Hogg County.—Humble Oil & Refining Co. cemented 5½-in. casing at 4,622 ft. at 4-B Mestena Oil & Gas Co., 12 miles south of Hebbronville, and was preparing to perforate. Total depth of this wildcat was 5,700 ft. in shale.

Live Oak County.—Henderson Coquat 3 E. V. Reagan, a mile west of Oakville, was moving in material. His discovery well, 1 W. W. Goebel, 2½ miles east of Oakville, was still undergoing tests. The latest reported, through perforations at 6,972-82 ft., yielded 31 bbl. of distillate through $\frac{3}{16}$-in. choke in 24 hours, with casing pressure of 1,830 lb. and gas-oil ratio of 50,000. There are five wildcat op-

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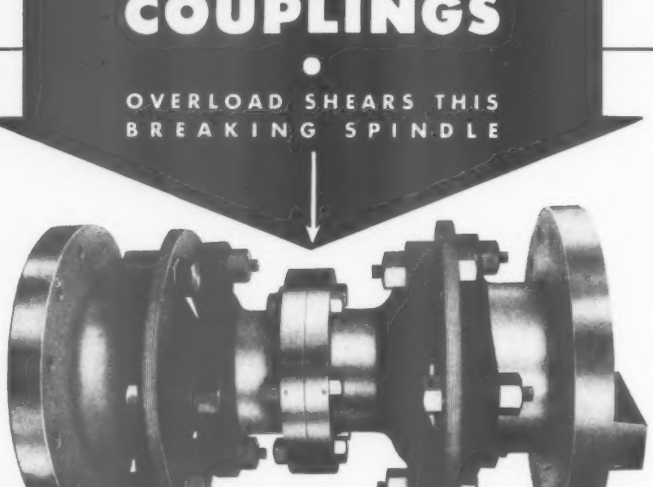

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erations, in various stages, in the county.

SOUTH TEXAS COMPLETIONS

Wildcats

Starr County: Sun 1 P. L. Salinas, 2 mi. SE of North Sun field, junked and abandoned at 1,048 ft.

Fields

Aviator, Webb County: George Buck and J. N. Abel, Alberca de Arriba grant, A-1996, 66 bbl. pumping, T.D. 1,811 ft.

Barbacoas, Starr County: W. L. Goldston et al 1 Alberto Gutierrez, Jose Salvador de la Garza Porcion 88, 5½ bbl. through ⅛-in. choke, T.P. 50 lb., gas-oil ratio 1,650, perf. 2,848-62 ft., T.D. 4,004 ft.

Cadena, Duval County: Taylor Refining Co. 2-A E. A. Parr, B.S.&F. Sur. 303, A-83, 4,600,000 cu. ft. gas and 22 bbl. distillate open flow, S.I. T.P. 1,950 lb., perf. 5,283-85 ft., T.D. 5,757 ft.

Mirando Valley, Zapata County: Dulup Oil Co. 1 Robert Hinnant, Robert Hinnant Sur. 126, dry at 2,064 ft.

North Sun, Starr County: Sun 5 C. Laurel, La Salle Colorada grant, A-157, 55 bbl. through 9/64-in. choke, T.P. 900 lb., S.I. C.P. 1,150 lb., gas-oil ratio 1,115, perf. 4,546-50 ft., T.D. 4,557 ft.

Strake, Duval County: Stanolind and Mills Bennett 5-A Farmers Life Insurance Co. B, J. H. Maynard heirs Sur. 6, A-349, 128 bbl. oil, with 21 bbl. salt water, through ¼-in. choke, T.P. 280 lb., C.P. 1,140 lb., gas-oil ratio 270, top of pay 3,238 ft., T.D. 3,246 ft.

SOUTH CENTRAL TEXAS COMPLETIONS

Wildcat

Caldwell County: M. B. Kelley Co. 1 Aline Taft, Jonathan Burleson Sur., A-34, dry at 2,093 ft.

Fields

Chittim, Maverick County: Rycade Oil Co. 1 J. M. Chittim, I.&G.N. R.R. Sur., dry at 5,735 ft.

Dale, Caldwell County: Ralph R. Ogden 20 F. H. Talley, W. C. Swearingen Sur. 262, 35 bbl. pumping, T.D. 2,292 ft.

LOWER GULF COAST COMPLETIONS

Wildcats

Goliad County: Sun 1 Gena Heard, 10 mi. NW of Goliad, dry at 9,003 ft.

Kenedy County: Humble 2 H. F. McGill et al, 10 mi. SW of Sarita, dry at 7,738 ft.

Refugio County: P. R. Rutherford et al, 1 mi. SE of Inari, 30,000,000 cu. ft. gas, open flow, with 5 bbl. distillate per million cu. ft. of gas, R.P. 2,070 ft., perf. 5,035-38 ft., T.D. 7,134 ft. Gas discovery. Named Inari field.

Fields

Agua Dulce, Nueces County: Ginther, Warren & Ginther 1 Eleanor Kinsey, Puencitas grant, location abandoned.

Jay Simmons 4 J. B. Traybig, Palo Alto grant, 187 bbl. through ⅛-in. choke, T.P. 970 lb., C.P. 1,220 lb., gas-oil ratio 785, perf. 7,120-24 ft., T.D. 7,170 ft., P.B. 7,130 ft.

Hobson, Karnes County: Seaboard 1 C. F. Swiezi, E. Seguin grant, A-10, dry at 4,059 ft.

North McFaddin, Victoria County: Union Producing Co. 3 P. Rydolph, J. F. Kemper Sur., 304 bbl. through ¼-in. choke, T.P. 875 lb., C.P. 560 lb., gas-oil ratio 455, perf. 5,358-69 ft., T.D. 5,375 ft.

Richard King, Nueces County: Southern Minerals Corp. 7-C Richard King, Agua Dulce grant, 75.86 bbl. through 7/64-in. choke, T.P. 675 lb., C.P. 1,025 lb., gas-oil ratio 386, perf. 5,366-74 ft., T.D. 5,590 ft., P.B. 5,374 ft.

Sun 3 E. M. Brownlee, Agua Dulce grant, 23 bbl. oil, with 103½ bbl. salt water, through ¼-in. choke, T.P. 100 lb., C.P. 1,000 lb., gas-oil ratio 1,300, T.D. 5,574 ft.

Stratton, Nueces County: Chicago Corp. 53 G. P. Wardner, Paso Ancho de Arriba grant, dual completion from perf. 6,356-58 ft., 143.21 bbl. through ⅛-in. choke, C.P. 1,750 lb., gas-oil ratio 3,598; from perf. 6,395-6,402 ft. 145.91 bbl. through ⅛-in. choke, T.P. 640 lb., gas-oil ratio 850; T.D. 6,681 ft., P.B. 6,405 ft.

ILLINOIS

Wildcats in Wayne County Open Productive Areas

CENTRALIA, Ill. — Wildcats in Wayne County uncovered oil in three spots, one in Township 1n-5e, and two in Township 1n-8e. Initial production averaged about 40 bbl. each. A very small initial output resulted in a wildcat completion in 4-1s-12w, Wabash County. The best completion of the week in the state was a 400-bbl. well in Hamilton County, producing from Aux Vases sand in the Rural Hill field.

Five miles east of Wayne City in Wayne County, Ohio Fuel Supply Co. 1 Nussbaum, a wildcat, C NW SW 13-2s-6e, pumped 168 bbl. in 13 hours from McClosky lime at 3,308-15 ft. It was not yet a completion. The test is 3 miles southwest of West Fairfield pool.

Luttrell et al 11-A Reed heirs, NE SW NW 14-5n-5e, Iola pool, Clay County, while not yet completed, swabbed between 350 and 400 bbl. of oil per day at a total depth of 2,387 ft., and the crew was still testing.

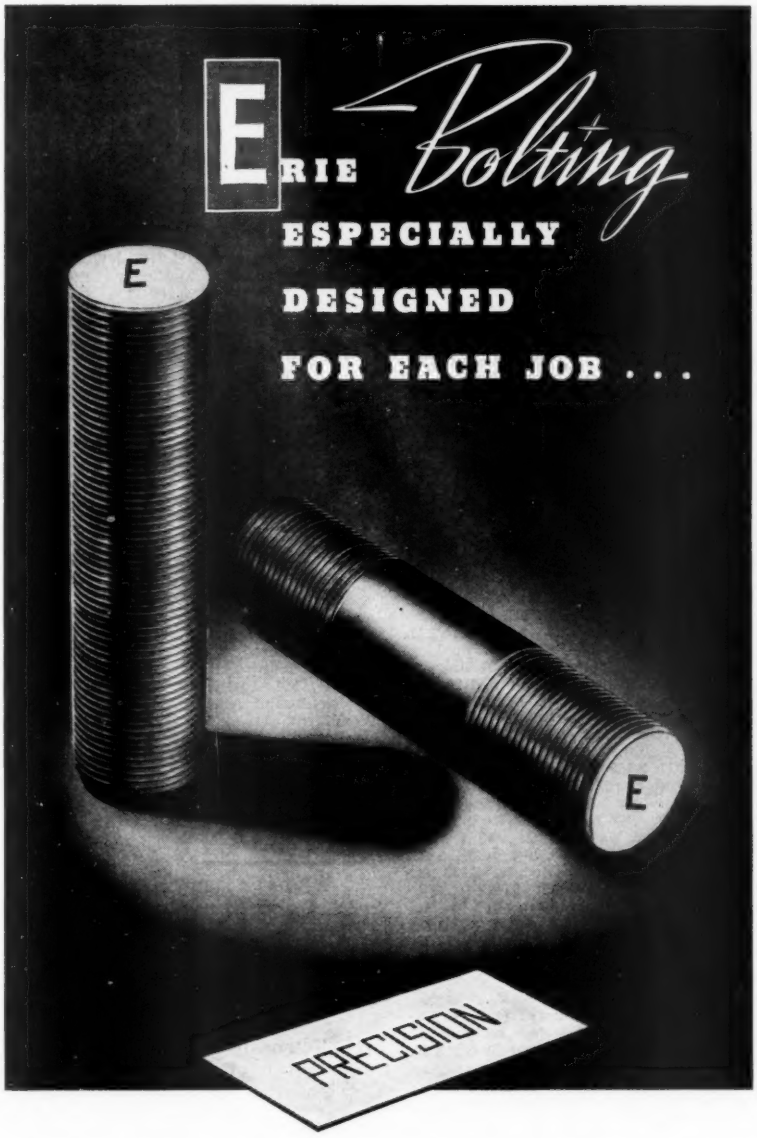
Thirty-three new operations were started during the week, including 18 wildcats as follows: K. M. Boyer 1 Kiefer, SE SE NW 20-4s-4e, Jefferson County; E. P. Adkins, NW NE NE 19-4s-3e, Franklin County; W. P. Muller 1 Smiley, NW SW NW 32-2n-7w, St. Clair County; Central Pipe Line 1 Hoar, C SW NW 26-2n-4w, Clinton County; Olds Oil Co. 1 A. I. Viehman, NE SE NE 2-1s-13w, Wabash County; J. H. Williams 1 Dalton Community, C SE SW 13-2s-4e, Jefferson County; J. A. Barbre 1 Monroe, NE NE NW 36-4s-4e, Jefferson County; W. C. McBride, Inc., 1 L. Stanley, SW SW NE 3-4n-8e, Clay County; Paul Mosebach 1 M. B. Skidmore, 520 ft. from the south and 610 ft. from the east lines NE SE 29-3n-2w, Clinton County; Big Chief 1 Deetrick, NW NW SE 15-3n-3e, Marion County; Sohio 1 G. E. Moses, NE NE SW 28-10-9e, and National Consumers Oil 1 Stevens, C E½ NE SW 8-9n-9e, both in Cumberland County; Aetna Oil 1 Spengel, NW NW SE 29-5n-4w, Bond County; Leland Waggoner 1 Burton, C NW NE 11-5n-4e, Fayette County; Mid-Continent Petroleum 1 Kleeman, NE NW SW 11-5n-1e, Marion County; A. C. Murray 1 Paulsen, NE NE SE 1-28n-9e, Ford County; O. A. Reed et al 1 C. Ross, SE SE SW 21-15n-3w, Sangamon County, and W. M. Cartmell et al 1 Gannaway, SE NW SE 2-11n-8, Coles County.

ILLINOIS COMPLETIONS

Wildcats

Clay County: Gulf 1 T. C. Higgins, NW NW SE 19-1n-5e, dry at 3,077 ft., lower Glen Dean 2,375 ft., Ste. Genevieve 2,887 ft., McClosky 2,952-54 ft. and 3,042-46 ft.

Clinton County: Wiser 1 Wessell, NE NW



OUR business has always been the making of bolts, studs and nuts to specifications with emphasis on the specials. Our customers are legion; 25 pieces here, a hundred there, and thousands for that special refinery-synthetic plant.

Today your Boss is our Boss and when we ask old customers to be patient, you know what we mean. We are working 100%, day and night, on vital war work, which as you know is scheduled by Uncle Sam with the one thought of winning the war, not of winning or holding good will. That part of business is reserved for peacetime.

SPEED THE DAY OF VICTORY—BUY BONDS

SW 22-1n-2w, dry at 2,816 ft., Paint Creek 1,235 ft., Benoist 1,272 ft., Aux Vases 1,330 ft., Ste. Genevieve 1,416 ft., St. Louis 1,535 ft., Louisiana 2,643 ft., Chattanooga 2,648 ft., Devonian 2,700 ft.

Coles County: S. D. Walker et al 2 Guy Sutton, NE NE SE 36-14n-7e, dry at 1,894 ft., upper Glen Dean 1,532 ft., Golconda 1,600 ft., Cypress 1,635 ft.

Hamilton County: Texas 1 Meador, SE SW NW 23-5s-6e, dry at 3,400 ft., Levias lime 3,248-57 ft.

Marion County: Bergenthal 1 Sloan, NE NW SW 12-3n-1e, dry at 1,812 ft., Cypress 1,536 ft., Benoist 1,678 ft., Benoist sand 1,686 ft., Renault 1,726 ft., Aux Vases 1,738 ft., Ste. Genevieve 1,807 ft.

Saline County: Herndon Drilling 1 D. Busler, NW NE NW 28-7s-6e, dry at 3,315 ft., Menard 2,244 ft., lower Menard 2,319 ft., no Waltersburg, Vienna 2,377 ft., Tar Springs 2,411 ft., upper Glen Dean 2,503 ft., lower Glen Dean 2,522 ft., Hardinsburg 2,588 ft., Golconda 2,654 ft., Barlow 2,787 ft., Cypress 2,841 ft. Paint Creek 2,907 ft., Barlow 2,961 ft., upper Renault 3,010 ft., lower Renault 3,067 ft., Aux Vases 3,091 ft., no Aux Vases sand, Ste. Genevieve 3,127 ft., Levias 3,129 ft., Fredonia 3,167 ft., McClosky 3,172-78 ft. and 3,268-81 ft.

Wabash County: Perrine & Laswell 1 James Bye, NE NE NE 33-2n-12w, dry at 1,547 ft., Biehl sand 1,540-47 ft.

George & Wrather 1 Dunkel, SW SW NW 4-1s-12w, pumped 3 bbl. oil, 5 bbl. water, Cypress sand 1,989-2,004 ft., T.D. 2,347 ft., P.B. to 2,065 ft. New pool.

Wayne County: Wisconsin O. & R. 1 Powless, C NE SW 13-1n-5e, pumped 30 bbl. oil in 21½ hr., sand 2,968-80 ft., shot at 2,971-84 ft., T.D. New pool.

Pure 1 Myrtle Fitch, C NE NW 14-1n-8e, pumped 44 bbl., McClosky lime at 3,075-79 ft., T.D. 3,085 ft.

Rockhill and Pure 1 Al Riggs, C NE NE 22-1n-8e, pumped 6½ bbl. oil and 7 bbl. water, T.D. 3,145 ft., P.B. to 3,054 ft.

Canterbury and Mabee Drlg. 1 H. J. Weaner, SE SE SE 11-1s-9e, dry at 3,450 ft., Glen Dean 2,726 ft., Barlow 2,943 ft., Cypress 2,958 ft., Weiler 3,022 ft., Benoist 3,132 ft., upper Renault 3,186 ft., lower Renault 3,231 ft., no Aux Vases, Ste. Genevieve 3,289 ft., Fredonia 3,339 ft., no McClosky, St. Louis 3,445 ft.

Fields

Belle Rive, Jefferson County: Gulf 1 Nathan, C NE NW 27-3s-4e, pumped 112 bbl., McClosky lime at 3,091-93 ft., T.D. 3,201 ft.

Clay City, Wayne County: C. Robinson 1 W. L. Robertson, SE NW NE 2-1n-7e, dry at 3,045 ft., upper Glen Dean 2,427 ft., lower Glen Dean 2,450 ft., Golconda 2,532 ft., Barlow 2,609 ft., Cypress 2,643 ft., Weiler 2,714 ft., Paint Creek 2,775 ft., Paint Creek sand 2,790 ft., Renault 2,874 ft., Aux Vases 2,893 ft., Ste. Genevieve 2,946 ft., Fredonia 3,002 ft., McClosky 3,010-18 ft.

Iola, Clay County: Texas 1 C. T. Wade, C NE SE 14-5n-5e, pumped 202 bbl., McClosky lime 2,453-59 ft., acid., T.D. 2,466 ft.

Carter Oil 1 Harper, SW cor. NE SE NE 14-5n-5e, dry at 2,553 ft., upper Glen Dean 1,938, Cypress 2,107 ft., Cypress sand 2,120 ft., Benoist 2,265 ft., Aux Vases 2,326 ft., Ste. Genevieve 2,379 ft., McClosky 2,411-14 ft. and 2,435-40 ft.

Gulf 1 Pilcher, C NW SW 13-5n-5e, dry at 2,421 ft., Glen Dean 1,995 ft., Golconda 2,005 ft., Barlow 2,106 ft., Aux Vases 2,332 ft., Ste. Genevieve 2,380 ft., Fredonia 2,408 ft., McClosky 2,412-20 ft.

New Harmony, White County: Superior 14 Greathouse, NE SE NE 4-5s-14w, pumped 142 bbl., T.D. 2,825 ft., P.B. to 2,725 ft. and pipe perforated; Cypress sand 2,578-2,609 ft., Benoist sand 2,685-2,725 ft., shot at 2,698-2,725 ft.

North Benton, Franklin County: E. S. Adkins 2-B Orient, SW NW NE 12-7s-2e, pumped 50 bbl., shot at 2,068-78 ft., T.D. 2,080 ft.

North Calvin: W. C. McBride 1 Arnold Hon, SW SW NE 6-4s-14w, pumped 40 bbl., Biehl sand 1,524-42 ft., shot at 1,530-60 ft., T.D.

Northeast Inman, Gallatin County: Carter Oil 5 J. L. Crawford, NW SE NE 11-8s-10e, pumped 39 bbl., Tar Springs sand 2,054-66 ft. and 2,069-74 ft., shot, T.D. 2,074 ft.

North King, Jefferson County: Modert et al 2 L. Wallace, NE SE SE 28-3s-3e, pumped 2 bbl., Aux Vases sand 2,714-28 ft. and 2,731-45 ft., shot, Levias lime 2,767-92 ft., acidized, T.D. 2,794 ft.

Olney, Richland County: Southwestern 1 G. W. Conover, NE NW NW 34-4n-10e, pumped 3 bbl., McClosky lime, 3,061-63 ft., acid., T.D. 3,100 ft.

Phillipstown, White County: Eason et al 1 Clark, SE NW NW 30-4s-11e, pumped 231 bbl., shot at 1,341-46 ft., Clark sand 940-57 ft., Penn sand 1,028-50 ft. and 1,050-69 ft., a water sand, T.D. 1,346 ft.

Rural Hill, Hamilton County: E. V. Schulte 1 Warren Ritcheson, NE SW SE 23-6s-5e, pumped 5 bbl. oil, 35 bbl. water, Levias lime 3,173-81 ft. and 3,186-90 ft., T.D.

Texas 2 V. Johnson, SE SW NW 18-6s-6e, flowed 411 bbl. through 2-in. tubing, ¼-in. choke, Aux Vases sand 3,183-89 ft. and 3,191-3,202 ft., T.D. 3,207 ft.

Salem, Marion County: Texas 11 Shanafelt, NE NW NE 16-2n-2e, pumped 100 bbl., Benoist sand 1,853-57 ft., shot at 1,872-88 ft., T.D. 1,889 ft.

South Lawrence, Lawrence County: Smith & Nye 3-C Spidel, NW SW NW 26-2n-12w, junked at 1,428 ft.

Wabash County: Indilky 1 Courtney, NW NE NE 26-1n-12w, pumped 75 bbl., Biehl sand 1,437-50 ft., T.D.

Woodlawn, Jefferson County: Texas 2 J. Rosenberg, NW NE NW 35-2s-1e, pumped 47 bbl. oil and 30 bbl. water, Benoist sand 1,997-2,003 ft., shot, T.D. 2,005 ft.

MICHIGAN

Second Field Opened in Newaygo County

SAGINAW, Mich.—Development of another discovery well in Goodwell Township, Newaygo County, 3 miles south of the Woodville field, now under development, and completion of the biggest producer in weeks on a location previously abandoned under OPC spacing orders featured the past week's activities in Michigan oil fields as operators completed 16 tests for 6 new oil producers, 3 more gas wells and 7 others as dry holes.

The discovery well, Pure Oil Co. 1 Harris in Section 8 of Goodwell flowed 53 bbl. its first hour and the company announced flow totaled 419 bbl. natural the first 15½ hours. Production is from the Traverse, depth of the well is 2,742 ft.

The department reported it is planning another state-lands oil and gas lease auction in August, applications for rights to more than 25,000 acres having been received in recent weeks. Acreage concerned is 4,000 in Antrim, 8,000 in Otsego, 3,000 in Midland, 3,000 in Roscommon, 2,500 in Iosco, 4,000 in Ogemaw, and small tracts in Bay, Mecosta and Osceola.

MICHIGAN COMPLETIONS

Allegan County, Cheshire Township: A. W. Winchester 1 Abbott, N½ NW SE 34-1n-14w, wildcat, dry, T.D. 1,315 ft.

Fillmore Township: J. W. Lang, Inc.-Michigan Devonian Pet. Co. 1 Dozeman & VandenBeldt, SW SE NE 11-4n-15w, wildcat, pumping 30 bbl., acid., T.D. 1,541 ft.

Missaukee County, Riverside Township: Taggart Bros. Co. 60 Yager, NE 27-21n-7w, 11,500,000 cu. ft. gas, T.D. 1,396 ft.

Taggart Bros. Co. 63 Whittet et al, NW Sec. 23, 7,500,000 cu. ft. gas, T.D. 1,372 ft.

Montcalm County, Belvidere Township: Belvidere Oil Co. 1 Mackie comm., NW NE SE 18-12n-7w, dry, T.D. 3,575 ft. (Test completed originally as natural-gas producer in August 1941.)

Newaygo County, Goodwell Township: Pure Oil Co. 1 Harris, E½ NE SE 8-14n-11w 419 bbl., first 15½ hr., natural, T.D. 2,742 ft.

Norwich Township: Ohio Oil Co. 2 Vaughn, S½ NW NE 29-15n-11w, pumping 25 bbl., acid., T.D. 2,850 ft.

Ohio Oil Co. 1 Barbas, S½ SW NW Sec. 28, dry, T.D. 2,900 ft.

Ohio Oil Co. 3 Swanson-Modrow-Allman-Smith, SE Sec. 20, 4,700,000 cu. ft. gas, T.D. 1,196 ft.

Ogemaw County, Horton Township: Arenac Oil & Gas Co. 1 LaPorte, NE SW NE 22-21n-2e, wildcat, dry, T.D. 1,683 ft.

Sun Oil Co. 1 Decker, NE NW Sec. 28, pumping 75 bbl., and salt water, acid., T.D. 3,782 ft.

Ottawa County, Holland Township: Regal Dutch Petroleum Co. 1 Petroelje, SW NW 36-5n-15w, 280 bbl., acid., T.D. 1,478 ft.

Zeeland Township: Howard E. Fowler 1 Baron, NW NE SW 31-5n-14w, dry, T.D. 1,519 ft.

Roscommon County, Roscommon Township: Eugene Hilliard A-4 State, S½ SW SE Sec. 34, est. 2,160 bbl., natural, T.D. 3,437 ft.

Van Buren County, Bangor Township: Socony-Vacuum Oil Co., Inc., 1 De Leo, NE NE SE 8-2s-16w, dry, T.D. 1,027 ft.

Geneva Township: Augie Busk 1 Fillbrandt SE NE NW 3-1s-16w, wildcat, dry, T.D. 1,135 ft.

Texas Gulf Coast

(Continued from Page 100)

Branch, G. F. and M. T. Simons Sur., 54 bbl. through ⅛-in. choke, T.P. 300 lb., C.P. 45 lb., gas-oil ratio 645, perf. 6,405-09 ft., T.D. 6,500 ft., P.B. 6,417 ft.

Katy, Waller County: Ohio Oil Co. 1 Adda F. Smock, H.&T.C. Sur., 144 bbl. through ⅛-in. choke, T.P. 625 lb., C.P. 1,400 lb., gas-oil ratio 651, T.D. 7,446 ft., P.B. 6,900 ft.

Markham, Matagorda County: Martin Thompson 1-B B. J. Sisk, W. Hadden Sur., A-194, 75 bbl. oil, with 5 per cent salt water, through 5/32-in. choke, T.P. 100 lb., C.P. 550 lb., perf. 3,232-36 ft., T.D. 3,246 ft.

North Markham, Matagorda County: Ohio Oil Co. 19 J. C. Carlson, I.&G.N. R.R. Sur., A-329, 364 bbl. through 10/64-in. choke, T.P. 1,150 lb., C.P. 1,750 lb., gas-oil ratio 588, perf. 7,718-24 ft., T.D. 8,465 ft., P.B. 8,107 ft.

North La Ward, Jackson County: Cities Service Chamrad unit 5, Jessie White Sur., A-82, 214.72 bbl. through ⅜-in. choke, T.P. 300 lb., C.P. 640 lb., gas-oil ratio 268, perf. 5,213-34 ft., T.D. 5,247 ft.

Hewitt & Jackson 1 George R. Hawes, Jessie White Sur., A-82, 50 bbl. through 3/32-in. choke, T.P. 480 lb., C.P. 710 lb., gas-oil ratio 25.3, perf. 5,213-16 ft. and 5,221-26 ft., T.D. 5,270 ft., P.B. 5,234 ft.

Stowell, Jefferson County: Texas 1 T. F. Koch, E. Lopez lge., A-37, O.W.W.O., dual completion; from perf. 7825-40 ft. 444½ bbl. through 12/64-in. choke, T.P. 1,380 lb., gas-oil ratio 633; from perf. 7,527-32 ft. 308.91 bbl. through 12/64-in. choke, C.P. 1,000 lb., gas-oil ratio 534; cleaned out to old P.B. T.D. 7,840½ ft.

OKLAHOMA

Cromwell Sand Discovery Makes Large Flow

MIDCO OIL CORP.'s Cromwell sand discovery in Okfuskee County reversed the usual procedure when it flowed 1,775 bbl. of high-gravity oil in less than 24 hours, or at a rate far in excess of previous indications. The well, 1 Turner Community, NE NW NE 24-12n-8e, found the sand at 3,486-3,506 ft. The last 3 hours of the test averaged 111 bbl. of oil an hour. Gulf Refining Co. is taking the oil. Sunray Oil Co. 1 Edwards, a west offset, was started last week and was drilling ahead after setting surface pipe.

Oklahoma County.—Prospects for a second producer for the West Edmond pool were good last week at Magnolia Petroleum Co. 1 Ringer, SE SE 31-14n-4w. The well was running high on the Hunton and recovered some 1,000 ft. of oil, with no water, on a drill-stem test at 6,987-90 ft. The well is southwest of the discovery. Successful completion of the 1 Ringer would stimulate additional offsets, since a number of recent discoveries have been of the one-well variety.

Washita County.—Gulf Oil Corp.'s 1 Hopkins, NW SE 8-8n-20w, was swabbed in after running tubing to 5,565 ft. In the first 24 hours it swabbed and flowed 125 bbl. of oil, a little higher than was generally expected and on the next two 24-hour tests made 40 and 87 bbl. of oil. Gravity is 36.6 at 92°. Production is from granite wash at 5,550-62 ft., with total depth at 5,567 ft. It was reported that operators may replace the standard tools with rotary and go to the Wilcox.

Noble County.—The Atlantic Refining Co. was considering deepening its 1 Dayton, SE NE NE 13-21n-2w. to the Wilcox. It was said that a possible thinning of the Misener sand prompted the action. Top of the Misener was 5,063 ft. Operators recovered considerable water with oil while coring at 5,065-69 ft. The 1 Dayton is a south offset to Atlantic's discovery, which flowed 300 bbl. in the sand at 5,050-64 ft.

OKLAHOMA COMPLETIONS

Wildcats

Comanche County: G. O. English 1 Worthen, N½ NW NW 3-1n-12w, dry, T.D. 990 ft., granite 985 ft.

Okfuskee County: Wood Oil 1 Turner, SE SE NW 9-11n-11e, dry, T.D. 3,698 ft., Cromwell 2,940 ft., Hunton 3,546 ft., Viola 3,645 ft., Wilcox 3,688 ft.

Pottawatomie County: Stanolind-Amerada-Atlantic 1 Atwater, SE NE 34-8n-3e, flowed 50 bbl., C.P. 1,030 lb., Hunton 4,630-34 ft., T.D. 4,650 ft.

Fields

March, Payne County: Texas Co. 2 Cullison, SE NW NW 5-17n-5e, pumped 105 bbl., Bartlesville 3,648-62 ft., T.D. 3,674 ft.

Skedee, Pawnee County: A. G. Talbott 1 Longmire, NW NW SW 35-22n-6e, pumped 33 bbl., sand 2,721-38 ft., T.D. 2,997 ft.

Stroud, East, Creek County: Fleet et al 2 Keys, NW SW 8-14n-7e, flowed 240 bbl., Prue sand 2,844-2,911 ft., T.D. 2,913 ft.

Velma, Stephens County: Skelly 5 Robberson, NW NE 35-1s-5w, dry, T.D. 8,690 ft., Hunton 5,395 ft., Viola 6,405 ft., blew out at 6,913 ft., cleaned itself in 10 minutes and flowed heavy black oil, estimated 20 bbl. an hr. and 20,000,000 cu. ft. gas.

Skelly 22 McClanahan, SW NE SW 35-1s-5w, dry, T.D. 930 ft.

Wewoka townsite, Seminole County: Jordan Pet. 2 Orr, NW NE SW 16-8n-8e, flowed 956 bbl., 2,660,000 cu. ft. gas, Gilcrease 3,104-23 ft.

Miscellaneous

Creek County: Sinclair Prairie 43 Litchfield, E½ NE NE 21-17n-7e, repressure well, T.D. 2,855 ft.

Gulf 43 Pitman, SW SE SE 7-17n-12e, input well, T.D. 1,557 ft.

L. B. Jackson 1 Gilcrease, SE NW NW 34-17n-12e, dry, T.D. 2,706 ft.

Hughes County: W. A. Delaney 2 Scott, NW SE NW 23-6n-8e, dry, T.D. 2,707 ft.

Kay County: Ingling & Parker 1 Caughlin, SW SW 29-25n-1e, dry, T.D. 3,247 ft., Layton 3,218 ft.

Okmulgee County: Klingensmith 1-A Weldy, S½ SE NE 30-16n-12e, 11,000,000 cu. ft. gas, sand 2,152-71 ft.

Osage County: Burch-Clyray, NW SW SE 36-22n-8e, swabbed 30 bbl., T.D. 524 ft.

Payne County: Oklahoma Gaso Plants 1 Carter, NW NE SW 9-18n-6e, dry, T.D. 3,631 ft., second Wilcox 3,611 ft.

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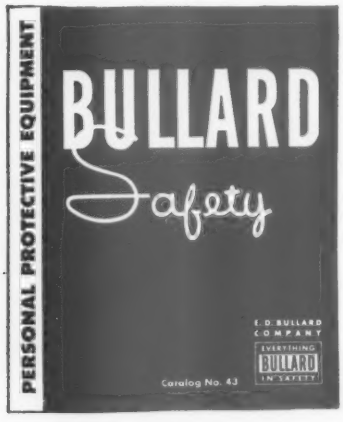

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EVERYTHING BULLARD IN SAFETY

OHIO, KENTUCKY

Gallia County Wildcat Is Gas Discovery

ZANESVILLE, Ohio.—A new shallow gas pool in Morgan Township, Gallia County, is indicated by the Ohio Fuel Co. completion on the Timothy Logue tract in Section 23. The location was made on a surface high and is the first producer in the township. The top of the sand was found at 576 ft. and drilling stopped at 9 ft. in.

The second completion in the new Worthington pool in Richland County made 2,457,000 cu. ft. from the Clinton sand at 2,789-2,809 ft. The Ohio Fuel's wildcat test on the U. S. Experiment farm in the north part of Washington Township, Muskingum County, found the Clinton sand broken and dry. Four additional locations have been staked in Falls Township, Muskingum County, near the Wittmer discovery on the Johnson farm.

OHIO COMPLETIONS

Athens County, Canaan Township: Bern O. & G. 1 Carrie Hill, Sec. 7, Berea, 150,000 cu. ft., T.D. 1,457 ft.
Carthage Township: C. W. Nuzum 2 Lenna Bails, Sec. 34, Maxon, dry, T.D. 1,085 ft.
Lodi Township: H. B. Walker 3 Eva Parker, Sec. 3, Mxbg. 800 ft., 200,000 cu. ft., T.D. 1,085 ft.
Rome Township: McBill Oil 4 B. O. Townsend, Sec. 30, Cow Run, 4 bbl., T.D. 498 ft.

Columbiana County, Knox Township: L. A. Hoffman 2 M. C. Witter, Sec. 28, Berea, 3 bbl., T.D. 762 ft.

Gallia County, Morgan Township: Ohio Fuel 1 Timothy Logue, Sec. 23, Salt sand, 489,000 cu. ft., T.D. 576 ft.

Guernsey County, Richland Township: Roy Early 1 W. D. Lashley, L-1, Berea, dry, T.D. 1,395 ft.

Holmes County, Killbuck Township: Kemrow 1 Owen Patterson, Sec. 17, Clinton, dry, T.D. 3,567 ft.
Paint Township: Ohio Fuel 1 J. D. Miller, Sec. 32, Clinton, 145,000 cu. ft., T.D. 4,246 ft.

Knox County, Jackson Township: Preston Oil 3 Manuel Rine, Sec. 2, Clinton, 25 bbl., T.D. 3,029 ft.

Lorain County, Eaton Township: Ohio Fuel 1 F. I. Hawke, Lot 6, Clinton, dry, T.D. 2,725 ft.

Medina County, Lafayette Township: Ohio Fuel 1 Milo Eaken, Lot 5, Clinton, 774,000 cu. ft., T.D. 3,188 ft.

Meigs County, Bedford Township: Ohio Fuel 1 Dayton Tubbs, Sec. 29, Berea, 41,500 cu. ft., T.D. 1,533 ft.

Muskingum County, Washington Township: Ohio Fuel 1 U.S.A., Lot 9, Clinton, dry, T.D. 3,784 ft.
Wayne Township: Atha 1 David Lazar, Sec. 11, Clinton, dry, T.D. 4,236 ft.

Noble County, Enoch Township: H. G. Clymer 3 F. A. Hartman, Sec. 16, Berea, dry, T.D. 1,697 ft.
Fulda Oil 11 T. S. Crum, Sec. 27, Stray, dry, T.D. 600 ft.

Perry County, Bearfield Township: Ohio Fuel 1 Margaret Hull, Sec. 1, Berea, 133,000 cu. ft., T.D. 1,170 ft.
Clayton Township: Pure Oil 10 James Pargeon, Sec. 7, Clinton, 42 bbl., T.D. 3,242 ft.
Madison Township: Ohio Fuel 2 John Gorski, Sec. 15, Clinton, dry, T.D. 3,469 ft.

Richland County, Worthington Township: Ohio Fuel 2 S. K. Stake, Sec. 36, 2,457,000 cu. ft., T.D. 2,811 ft.

Tuscarawas County, Sandy Township: Status Dev. 1 O. J. May, Lot 24, Clinton, 495,000 cu. ft., T.D. 4,822 ft.

Washington County, Barlow Township: Healey et al 14 D. R. Martin, Sec. 5, Injun, dry, T.D. 1,534 ft.
D. T. Orndoff 11 M. G. Bell, Sec. 30, Maxon, dry, T.D. 1,212 ft.
Grandview Township: E. H. Myers et al 2 Wm. A. Fauble, Sec. 19, Keener, 240,000 cu. ft. and 1 bbl., T.D. 1,588 ft.
Wesley Township: D. T. Orndoff 1 Roy Dodson, Sec. 5, Salt sand, 1,270,000 cu. ft., T.D. 915 ft.

EASTERN KENTUCKY

ASHLAND, Ky. — Recently attention was directed to Rowan County where the Gulf Oil Co. has contracted to drill several shallow and also some deep tests. The first well, southwest of Morehead and about 1½ miles from the Kentucky River, reached a total depth of 1,044 ft. and was dry.

EASTERN KENTUCKY COMPLETIONS

Floyd County: Kentucky-West Virginia Gas Co. 19 Cornelius Stevens, O.W.D.D., dry at 1,180 ft.

Johnson County: Kentucky-West Virginia Gas Co. 717 Belle Lester, dry at 2,569 ft.

WESTERN KENTUCKY COMPLETIONS

Hancock County: H. H. Vickers and A. J. Slagter 1 J. L. Crow, 2 mi. N of Roseville, pumped 20 bbl., Tar Springs sand 447-73 ft.

Henderson County: Cherry & Kidd 1 W. P. Cooper, 1 mi. N of Smith Mills, dry at

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2,741 ft., Menard 1,738 ft., upper Glen Dean 2,036 ft., lower Glen Dean 2,046 ft., Barlow 2,315 ft., Cypress 2,381 ft., Ste. Genevieve 2,582 ft.

Union County: Cherry & Kidd 1 Agnes Proctor et al, a wildcat, 3½ mi. NE of Uniontown, dry at 2,720 ft., Menard 1,713 ft., lower Glen Dean 2,014 ft., Golconda 2,137 ft., Barlow 2,238 ft., Cypress sand 2,298 ft., Ste. Genevieve 2,508 ft., McClosky 2,656-60 ft., with a show of oil.

Carter Oil 3 Russellburg, pumped 182 bbl. in 24 hr., Waltersburg sand 1,700-13 ft.

Kingwood 1 Smith-Proctor, a wildcat near Waverly, dry at 2,686 ft., Menard 1,719 ft., lower Menard 1,804 ft., Glen Dean 1,994 ft., Golconda 2,178 ft., Barlow 2,263 ft., Ste. Genevieve 2,484 ft., Fredonia 2,549 ft., McClosky 2,562-66 ft., with a show of oil, lower McClosky 2,675-83 ft., showing water.

Pure 2 Susan Hite, dry at 2,684 ft., Menard 1,718 ft., Glen Dean 2,012 ft., Barlow 2,278 ft., Ste. Genevieve 2,570 ft.

INDIANA COMPLETIONS

Gibson County: Continental 60 Amanta Maier, NE NW NW 13-3s-14w, pumped 30 bbl., Cypress sand 2,499-2,506 ft., T.D.

Vanderburgh County: W. F. Lacy and Al Cochran 1 Frank Fickas, SW SW NW 11-7s-10w, dry at 2,380 ft., McClosky lime at 2,266-69 ft., St. Louis lime 2,367 ft.

North Central Texas

(Continued from Page 105)

Ernest Prod. 4-A F. P. Warren, W. J. Smith Sur., pump 5 bbl., pay 610 ft., T.D. 627 ft.

Grace & Grace 1 Mrs. Pearl Boyd, Blk. 50, K.W.V.F.L. subd., dry, T.D. 1,833 ft.

Grace & Grace 1 Kemp & Kempner, Blk. 49, K.W.V.F.L. subd., dry, T.D. 1,825 ft.

Carl Johnston 1 J. F. Moore, Sec. 1, B.B. B.&C.R.R. Sur., dry, T.D. 681 ft.

Martin Prop. 2-A L. F. Ramming, Blk. 1, H. Hastie Sur., dry, T.D. 1,294 ft.

George Proctor 59 Ed Foster, Sec. 1, S.A.&M.G.R.R. Sur., dry, T.D. 1,075 ft.

George Proctor 1 R. D. McClure et al, G.C.&S.F.R.R. Sur., dry, T.D. 1,098 ft.

WEST CENTRAL TEXAS COMPLETIONS

Wildcats

Eastland County: E. M. Thomasson 1 Mrs. A. F. Tate, S. Lackerman Sur., dry, T.D. 2,476 ft.

Jones County: Merry Bros. & Perini 1 W. McD. Bowyer, 1,120 ft. from E, 1,680 ft. from S, 253-ac. tract, Sec. 37, Blk. 1, B.B.B.&C.R.R. Sur., elev. 1,648 ft., dry, T.D. 3,082 ft.

Palo Pinto County: Rathke Oil 1 E. C. Stovall, 2,000 ft. from N, 2,366 ft. from E, John P. Rohns Sur., Mississippi lime 4,786-95 ft., S.O., acid 1,000 gal., dry, T.D. 4,795 ft.

Shackelford County: Hickok & Reynolds 4 J. P. Morris, NW NE NE Sec. 188, E.T. R.R. Sur., dry, T.D. 1,778 ft.

Taylor County: Great Lakes Carbon 1 J. D. Porter, 1,763 ft. from N, 1,113 ft. from W, Sec. 11, J. A. Nabors Sur., dry, T.D. 2,880 ft.

Fields

Brown County: Central Texas Gas Co. 7 H. J. Perry, dry, T.D. 888 ft.

Vin Gamblin 1 H. T. Woods, Philip Geiger and W. M. English surveys, 112-ac. tract, dry, T.D. 550 ft.

Shackelford County: W. F. Palmer 1 John Diller, Sec. 2-A, H.T.&L. Sur., dry, T.D. 575 ft.

South Noodle, Jones County: Humble Oil & Ref. 2 Gunter, 2,090 ft. from S, 550 ft. from W, Sec. 34, Blk. 18, T.&P.R.R. Sur., pump 19 bbl., lime pay 2,457 ft., perf. 45 shots 2,456-66 ft., T.D. 2,467 ft.

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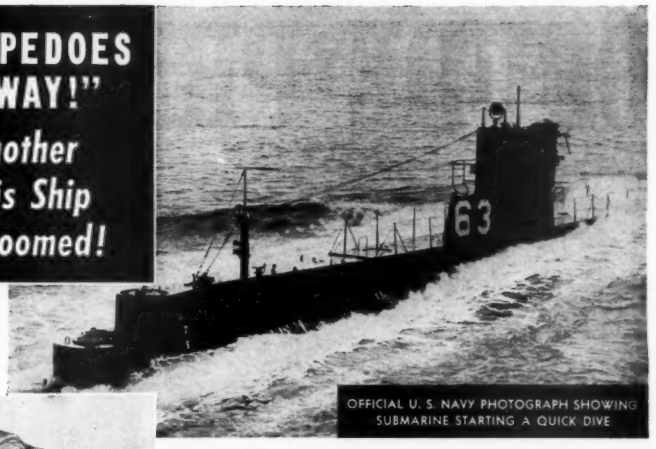
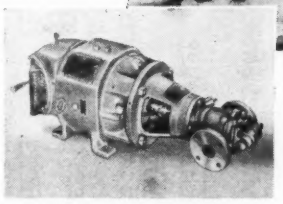


OFFICIAL U. S. NAVY PHOTOGRAPH SHOWING SUBMARINE STARTING A QUICK DIVE



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	1	2	3	4	5	6	7
Below 21	...	...	...	...	$.85	$.75	...
21-21.9					.87	.78	...
22-22.9					.89	.81	...
23-23.9					.91	.84	...
24-24.9					.93	.87	...
Below 25	$.92		...	$.86			
25-25.9	.95	$.95	...	.88	.95	.90	...
26-26.9	.97	.97	...	.90	.97	.93	...
27-27.9	.99	.99		.92	.99	.96	...
28-28.9	1.01	1.01	$1.01	.94	1.01	.99	...
29-29.9	1.03	1.03	1.03	.96	1.03	1.02	
30-30.9	1.05	1.05	1.05	.98	1.05	1.05	$1.05
31-31.9	1.07	1.07	1.07	1.00	1.07	1.07	1.07
32-32.9	1.09	1.09	1.09	1.02	1.09	1.09	1.09
33-33.9	1.11	1.11	1.11	1.04	1.11	1.11	1.11
34-34.9	1.13	1.13	1.13	1.06	1.13	1.13	1.13
35-35.9	1.15	1.15	1.15	1.08	1.15	1.15	1.15
36-36.9	1.17	1.17	1.17	1.10	1.17	1.17	1.17
37-37.9	1.19	1.19	1.19	1.12	1.19	1.19	1.19
38-38.9	1.21	1.21	1.21	1.14	1.21	1.21	1.21
39-39.9	1.23	1.23	1.23	1.16	1.23	1.23	1.23
40 and above	1.25	1.25	1.25	1.18	1.25	1.25	1.25

OKLAHOMA AND KANSAS TABLE EXPLANATION

Column 1 Mid-Continent grades:
Pure Oil Co., 5-20-41.
Gulf Oil Corp., 5-20-41.
Skelly Oil Co. (Kansas only), 5-19-41.
H. F. Wilcox Oil & Gas Co., 5-20-41.

Column 2 Mid-Continent grades:
White Eagle Oil Purchasing Co., Inc., 5-19-41, Kansas only.
Sinclair Prairie Oil Marketing Co., 5-20-41.

Column 3 Mid-Continent grades:
Continental Oil Co., 5-19-41.
Phillips Petroleum Co., 5-19-41.
Tide Water Associated Oil Co., 5-20-41.

Column 4 Jackson and Tillman counties:
Gulf Oil Corp., 5-20-41.

Column 5 Mid-Continent grades:
Standard Oil Co. (Indiana), 5-20-41.
National Refining Co., 5-20-41.

Column 6 Mid-Continent grades:
Magnolia Petroleum Co., 5-21-41.
Shell Oil Co., Inc., 5-19-41.
Shell, in Carter County, 12-5-41.
Ben Franklin Refining Co., 12-4-41.
Carter Oil Co. (Oklahoma only), 5-19-41.

Column 7 Oklahoma:
Champlin Refining Co., 5-20-41.

OKLAHOMA FLAT PRICE

Cumberland $1.14
Pure Oil Co., 9-4-41.

LOUISIANA AND SOUTHERN ARKANSAS TABLE EXPLANATION

Standard Oil Co. of Louisiana, 5-22-41.

Column 1 applies to Atlanta, Buckner, Magnolia, Schuler (Jones sand), Village, and Lewisville fields.

Column 2 applies to De Soto, Sabine, Fouke, Homer, Miller County, Sugar Creek, and Nebo.

Column 3 applies to Little Creek, Olla, and South Olla (4-3-43).

Column 4 applies to Bayou Mallet, Choctaw, Darrow, Jeanerette, Lirette, North Crowley, South Crowley, Port Barre, Potash, Roanoke, St. Martinville, and Port Allen.

Column 5 applies to University (Baton Rouge). Posted 6-2-42.

Column 6 applies to Cotton Valley crude, Rodessa and Shreveport (Cross Lake); also Anse La Butte, effective 8-1-41, starting at 80 cents for below 21°, also to Caddo effective 10-15-41.

Continental Oil Co., 5-21-41.

Column 7 applies to Abbeville, Louisiana.

Stanolind Oil & Gas Co., 5-21-41.

Column 8 applies to East and West Hackberry.

Column 9 applies to Caddo Parish, effective 10-15-41.

Column 9 applies to Evangeline, Acadia Parish.

Lion Oil Refining Co., 5-22.41.

Column 1 applies to Reynolds lime, Jones sand, Schuler, Ark.

Column 2 applies to El Dorado, West and South Rainbow fields, Snow Hill, and Schuler-Morgan sand.

Placid Oil Co., 5-22-41.

Column 3 applies to Olla.

Column 2 applies to Nebo field.

Shell Oil Co., Inc., 5-20-41.

Column 10 applies to Roanoke, Chalkley.

Column 11 applies to Iowa, Black Bayou, White Castle.

Column 12 applies to Gibson, South Houma, Hester, West Lake Verret.

Magnolia Petroleum Co., 5-21-41.

Column 13 applies to Lockport, Cameron Meadows, and West Gueydan, La.

Column 6 applies to Haynesville, Cotton Valley, Rodessa, La., and Miller County, Arkansas.

Phillips Petroleum Co., 3-29-41.

Arkansas Fuel Oil Co., 2-19-42.

Column 1, Schuler (Jones sand), except schedule starts at 76 cents for below 25° gravity.

Gulf Refining Co., 5-21-41.

Column 9, Jennings.

Column 8, Edgerly, Starks, Vinton, East Hackberry, Cameron Meadows, and Leesville.

Column 16 applies to Grand Bay, Quarantine Bay, Timbalier Bay, and West Bay, except schedule starts at $1.12 for below 28° gravity.

Column 6 applies to Caddo, Homer, Bull Bayou, Crichton, De Soto, Haynesville, and El Dorado.

Column 4 applies to West Gueydan, effective 5-25-42.

Pure Oil Co., 4-22-41.

Column 14 applies to Gueydan crude.

Column 6, Caddo, Homer, Haynesville, Bull Bayou, Crichton, De Soto, and El Dorado.

Texas Co., 5-21-41.

Column 6 applies to North Louisiana.

Columns 15 and 16, Bay St. Elaine, Caillou Island, Iberia, Lake Barre, Lake Pelto, Leesville, Port Barre. (Schedules A and B).

Column 17, Bateman Lake, Dog Lake, Fausse Point, Horseshoe Bayou, Jefferson Island, Plumb Bob, Vermilion Bay, West Cote Blanche, and Delta Duck Club.

Column 18, Delta Farm, Lake Salvador, Golden Meadow.

LOUISIANA AND ARKANSAS FLAT PRICES

Continental Oil Co.:
Tepetate and Lake Arthur, 5-21-41 ..... $1.18
Ville Platte, 5-22-43 ..... 1.30
Bear, 5-15-43 ..... 1.30
Gulf Refining Co., 5-21-41:
Smackover (Ark.) $0.83
Lion Oil Refining Co., 5-22-41:
Smackover (heavy) ..... .83
Dorcheat 1.15
Phillips Petroleum Co., 5-22-41:
Smackover (heavy) $0.83
Placid Oil Co., 5-22-41:
Tullos-Urania (5-21-41) $1.15
Cotton Valley dist. (above 60°) 1.30
Cotton Valley (Holloway sand) 1.25
Cotton Valley (Bodcaw-D sands) 1.20
Pure Oil Co.:
Bosco (5-21-41) $1.14
Sweet Lake (5-22-41) 1.06
Creole (5-22-41) 1.16
Republic Oil Co., 6-2-41:
Nevada County, Arkansas $0.80
Republic Oil Refining Co., 5-21-41:
Bayou Pigeon $1.30
Shell Oil Co., Inc., 5-20-41:
Happytown $1.15
Standard Oil Co. of Louisiana, 5-22-41:
Big Creek, Dorcheat, McKamie, Columbia, Macedonia (sour) (2-3-43) $1.25
Smackover (heavy) ..... .83
Cotton Valley distillate (9-1-41) 1.40
Cotton Valley (Holloway sand) 1.25

LOUISIANA AND SOUTHERN ARKANSAS GRAVITY TABLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 18	...	...	...	...	...	...	...	...	...	...	...	...	$.94	...	...	...	...	...
18-18.9	...	...	...	...	...	...	...	...	...	...	...	...	.96	...	...	...	...	...
19-19.9	...	...	...	...	...	...	...	...	...	...	...	...	.98	...	...	...	...	...
Below 20	...	...	...	...	...	...	...	$1.06	...	$.94	$.99	$.89	...	...	$1.06	...	...	...
20-20.9	...	...	...	...	...	...	...	1.08	...	.96	1.01	.91	1.00	...	1.08	...	...	...
Below 21	$.68	...	...	$.90	...	...	...	...	...	...	...	...	...	$.90	...	...	...	...
21-21.9	.70	...	...	.92	...	...	...	1.10	...	.98	1.03	.93	1.02	.92	1.10	...	...	...
22-22.9	.72	...	...	.94	...	...	...	1.12	...	1.00	1.05	.95	1.05	.94	1.12	...	...	...
23-23.9	.74	...	...	.97	...	...	...	1.14	...	1.02	1.07	.97	1.08	.96	1.14	...	...	...
24-24.9	.76	...	...	.98	...	...	...	1.16	...	1.04	1.09	.99	1.11	.98	1.16	...	...	...
Below 25	...	$.86	$1.03	...	...	$.88	...	...	...	...	...	...	...	...	...	...	...	...
25-25.9	.78	.88	1.05	1.00	...	.90	...	1.18	...	1.06	1.11	1.01	1.14	1.00	1.18	...	...	...
26-26.9	.80	.90	1.07	1.02	...	.92	...	1.20	...	1.08	1.13	1.03	1.17	1.02	1.20	...	...	...
27-27.9	.82	.92	1.09	1.04	...	.94	...	1.22	...	1.10	1.15	1.05	1.19	1.04	1.22	...	...	...
28-28.9	.84	.94	1.11	1.06	...	.96	...	1.24	...	1.12	1.17	1.07	1.21	1.06	...	$1.14	$1.06	...
29-29.9	.86	.96	1.13	1.08	...	.98	...	1.26	...	1.14	1.19	1.09	1.23	1.08	...	1.16	1.08	...
30-30.9	.88	.98	1.15	1.10	$1.28	1.00	...	1.28	...	1.16	1.21	1.11	1.25	1.10	...	1.18	1.10	$1.05
31-31.9	.90	1.00	1.17	1.12	1.30	1.02	...	1.30	$1.07	1.18	1.23	1.13	1.27	1.12	...	1.20	1.12	1.07
32-32.9	.92	1.02	1.19	1.14	1.32	1.04	...	1.32	1.09	1.20	1.25	1.15	1.29	1.14	...	1.22	1.14	1.09
33-33.9	.94	1.04	1.21	1.16	1.34	1.06	...	1.34	1.11	1.22	1.27	1.17	1.31	1.16	...	1.24	1.16	1.11
34-34.9	.96	1.06	1.23	1.18	1.36	1.08	...	1.36	1.13	1.24	1.29	1.19	1.33	1.18	...	1.26	1.18	1.13
35-35.9	.98	1.08	1.25	1.20	1.38	1.10	...	...	1.15	...	...	...	...	1.20	...	1.28	1.20	1.15
Below 36	...	...	...	...	...	...	$1.07	...	...	...	...	...	...	...	...	...	...	...
36-36.9	1.00	1.10	1.27	1.22	1.40	1.12	1.09	...	1.17	...	...	...	...	1.22	...	1.30	1.22	1.17
37-37.9	1.02	1.12	1.29	1.24	1.42	1.14	1.11	...	1.19	...	...	...	...	...	...	...	...	1.19
38-38.9	1.04	1.14	1.31	1.26	1.44	1.16	1.13	...	1.21	...	...	...	...	...	...	...	...	1.21
39-39.9	1.06	1.16	1.33	1.28	1.46	1.18	1.15	...	1.23	...	...	...	...	...	...	...	...	1.23
40 and above	1.08	1.18	1.35	1.30	1.48	1.20	1.17	...	1.25	...	...	...	...	...	...	...	...	1.25

Lisbon distillate $1.20

Texas Co., 5-21-41:
Erath $1.21
Garden Island 1.36
Lafitte, Paradis 1.19
Lake Mongoulois 1.36

CANADIAN FIELDS

Imperial Oil, Ltd.:
Petrolia, 11-6-39 ..... $2.10
Oil Springs, 11-6-39 ..... 2.07
Bothwell, 11-6-39 ..... 2.10
Turner Valley, 7-16-41 ..... $1.35-1.97

SOUTH TEXAS AND SOUTHWEST TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7
Below 20	$1.03	$1.08	$1.08	$.89	$1.03	$1.03	$1.08
20-20.9	1.05	1.10	1.10	.90	1.05	1.05	1.10
21-21.9	1.07	1.12	1.12	.91	1.07	1.07	1.12
22-22.9	1.09	1.14	1.14	.92	1.09	1.09	1.14
23-23.9	1.11	1.16	1.16	.93	1.11	1.11	1.16
24-24.9	1.13	1.18	1.18	.94	1.13	1.13	1.18
25-25.9	1.15	1.20	1.20	.95	1.15	1.15	1.20
26-26.9	1.17	1.22	1.22	.96	1.17	1.17	1.22
27-27.9	1.19	1.24	1.24	.97	....	1.19	1.24
28-28.9	1.21	1.26	1.26	.98	....	1.21	1.26
29-29.9	1.23	1.28	....	.99	....	....	1.28
30-30.9	1.25	1.30	....	1.00	....	....	1.30
31-31.9	1.27	1.32	....	1.01	....	....	1.32
32-32.9	1.29	1.34	....	1.02	....	....	1.34
33-33.9	1.31	1.36	....	1.03	....	....	1.36
34-34.9	1.33	1.38	....	1.04	....	....	1.38
35-35.9	1.35	1.40	....	1.05	....	....	1.40
36-36.9	1.37	1.42	....	1.06	....	....	....
37-37.9	1.39	1.44	....	1.07	....	....	....
38-38.9	1.41	1.46	....	1.08	....	....	....
39-39.9	1.43	1.48	....	1.09	....	....	....
40 and above	1.45	1.50	....	1.10	....	....	....

SOUTH TEXAS AND SOUTHWEST TEXAS TABLE EXPLANATION

Column 1 Mirando:
Humble Oil & Refining Co., 5-21-41, includes Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North and South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manila, Mirando Valley, Placedo, Randado, Sarnosa, and Tesoro.
Magnolia Petroleum Co., 5-21-41.
Continental Oil Co., 7-1-41, includes Hoffman, Government Wells (North and South), Lopez, Moco, Colmena, Seven Sisters, South Seven Sisters, Loma Novia, Conoco, Driscoll, O'Hern, Piedra Lumbre, and Tarantchauas.
American Mineral Spirits Co., 5-21-41, includes Adami and Munson.
Republic Oil Refining Co., 5-21-41, includes Heyser field crude.

Column 2 Refugio:
Continental Oil Co., 7-1-41, includes Minnie Bock, Clara Driscoll, South Clara Driscoll, Driscoll Ranch, Orange Grove and Wade City.
Humble Oil & Refining Co., 5-21-41, includes East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth Saxet, Taft, and Tom O'Connor.
American Mineral Spirits Co., 5-21-41, includes Plymouth, Taft, and East White Point.

Column 3 Refugio:
Texas Co., 5-21-41, includes Greta, Saxet, and Taft.

Column 4 La Rosa:
American Mineral Spirits Co., 3-29-41.

Column 5 Duval-Mirando:
Sun Oil Co., 5-21-41.

Column 6 Duval-Mirando:
Texas Co., 5-21-41.

Column 7 Nueces County:
American Mineral Spirits Co., 5-21-41.
Republic Oil Refining Co., 5-21-41.

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7	8	9
Below 20	....	....	....	....	$0.80	....	....	....	$0.80
20-20.9	....	....	....	....	.82	....	....	....	.82
Below 21	....	....	....	....	....	$0.85	....	....	....
21-21.9	....	....	....	....	.84	.87	....	....	.84
22-22.9	....	....	....	....	.86	.89	....	....	.86
23-23.9	....	....	....	....	.88	.91	....	....	.88
24-24.9	....	....	....	....	.90	.93	....	....	.90
Below 25	....	....	$0.88	....	....	....	$0.89	$0.95	....
25-25.9	$0.95	....	.90	$0.97	.92	.95	.91	.97	.92
26-26.9	.97	....	.92	.99	....	.97	.93	.99	.92
27-27.9	.99	....	.94	1.01	....	.99	.95	1.01	.92
28-28.9	1.01	$1.01	.96	1.03	....	1.01	.97	1.03	.92
29-29.9	1.03	1.03	.98	1.05	....	1 03	.99	1.05	.92
30-30.9	1.05	1.05	1.00	1.07	....	1.05	1.01	1.07	.92
31-31.9	1.07	1.07	1.02	1.09	....	1.07	1.03	1.09	.92
32-32.9	1.09	1.09	1.04	1.11	....	1.09	1.05	1.11	.92
33-33.9	1.11	1.11	1.06	1.13	....	1.11	1.07	1.13	.92
34-34.9	1.13	1.13	1.08	1.15	....	1.13	1.09	1.15	.92
35-35.9	1.15	1.15	1.10	1.17	....	1.15	1.11	1.17	.92
36-36.9	1.17	1.17	1.12	1.19	....	1.17	1.13	1.19	.92
37-37.9	1.19	1.19	1.14	1.21	....	1.19	1.15	1.21	.92
38-38.9	1.21	1.21	1.16	1.23	....	1.21	1.17	1.23	.92
39-39.9	1.23	1.23	1.18	1.25	....	1.23	1.19	1.25	.92
40 and above	1.25	1.25	1.20	1.27	....	1.25	1.21	1.27	.92

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS TABLE EXPLANATION

Column 1 West Central and North:
Humble Oil & Refining Co., 5-22-43, includes Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, and Throckmorton counties.
Panhandle Refining Co., 5-22-43, in Leuders area.
Gulf Refining Co., 5-22-43.
Sinclair Prairie Oil Marketing Co., 5-22-43.

Column 2 North Texas:
Continental Oil Co., 5-22-43.
Magnolia Petroleum Co., 5-22-43.
Panhandle Refining Co., 5-22-43.
Bell Oil & Gas Co., 5-22-43.
Texas Co., 5-22-43.

Column 3 East Central:
Magnolia Petroleum Co., 5-21-41, includes Cass, Panola, and Rodessa (Texas and Louisiana), and Miller County, Arkansas.
Gulf Refining Co., 5-21-41, includes Rodessa, Texas.

Column 4 East Central:
Humble Oil & Refining Co., 5-21-41, includes Anderson, Cherokee, Limestone, and Navarro counties and the Navarro Crossing field.

Column 5 East Central:
Humble Oil & Refining Co., 5-21-41, includes Hawkins field.

Column 6 North Texas:
Stanolind Oil Purchasing Co., 5-22-43.

Column 7 Fisher County:
Shell Oil Co., Inc., 12-11-41.

Column 8 Mexia:
Sinclair Prairie Oil Marketing Co., 5-30-41.

Column 9 Talco:
Magnolia Petroleum Co., 5-28-43.
Humble Oil & Refining Co., 5-28-43.

TEXAS FLAT-PRICE FIELDS

Agua Dulce (light), Benavides, Longhorn, Southland, and Sweden, 5-21-41 $1.35
Agua Dulce (heavy), 10-16-41 ..... $1.25
Republic Oil Refining Co., 5-21-41.
Alfred and Magnolia City $1.35
Continental Oil Co., 5-21-41.
Alice, Benavides (North Sweden), Ben Bolt, Clark-Muil, Sun, and Tom Graham $1.35
Humble Oil & Refining Co., 5-21-41.
Batson (new), Humble (35° and above), Fig Ridge, Hardin, Hull (25° and above), La Belle, North Dayton (25° and above), Seabreeze South China, West Orange, Willow Slough and Oyster Bayou $1.25
Sun Oil Co., 5-21-41.
Cass County $1.20
Texas Co., 5-21-41.
Cayuga, Anderson County $0.90
Pan American Production Co., 5-21-41.
Chapel Hill, Smith County:
Crude distillate $1.30
Crude oil 1.18
Chapel Hill Gas System, 11-7-41.
Clay Creek, Washington County $1.00
Sun Oil Co., 5-21-41.
Cleveland, Liberty County $1.26
Magnolia Petroleum Co., 5-21-41.
Conroe, Montgomery County $1.43
Humble Oil & Refining Co., 5-21-41.
Tide Water Associated Oil Co., 5-21-41.
Sun Oil Co., 5-21-41.
Texas Co., 5-21-41.
Cotton Lake (South) $1.35
Sun Oil Co., 5-21-41.
East Texas and Flag Lake* $1.25
*Humble Oil & Refining Co., 5-21-41.
Pan American Production Co., 5-21-41.
Tide Water Associated Oil Co., 5-21-41.
Gulf Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.
Sinclair Prairie Oil Marketing, 5-21-41.
Shell Oil Co., Inc., 5-20-41.
Sun Oil Co., 5-21-41.
Texas Co., 5-21-41.
Stanolind Oil Purchasing Co.
Esperson (35° and above), South Esperson $1.30
Sun Oil Co., 5-21-41.
Flour Bluff, East Flour Bluff $1.33
Humble Oil & Refining Co., 5-21-41.
Hockley and Cochran $0.87
Texas Co., 5-21-41.
Livingston and Mercy $1.25
Shell Oil Co., Inc., 5-20-41.
Long Lake $1.23
Sinclair Prairie Oil Marketing, 5-21-41.
Luby $1.35
American Mineral Spirits Co., 5-21-41.
Luling $1.05
Magnolia Petroleum Co., 5-21-41.
Lytton Springs $1.17
Magnolia Petroleum Co., 5-21-41.
Salt Flat, North Salt Flat, Darst Creek*, Hilbig, Clark, Carroll, and Zoborski $1.41
Humble Oil & Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.
*Texas Co., 5-21-41.
Rincon (North), Sun, North Sun and Garcia $1.35
Sun Oil Co., 5-21-41.
Yturria $1.45
Sun Oil Co., 3-19-42.
Talco $0.79
Humble Oil & Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.
Tomball and Satsuma $1.40
Humble Oil & Refining Co., 5-21-41.
*Magnolia Petroleum Co., 5-21-41.
Stanolind Oil Purchasing Co., 4-1-41.
Van, Van Zandt County $1.08
Humble Oil & Refining Co., 5-21-41.
Pure Oil Co., 5-21-41.
Yates (regular) $0.95
Humble Oil & Refining Co., 5-21-41.
Gulf Refining Co., 5-21-41.
Shell Oil Co., Inc., 5-20-41.
Yates (shallow) $0.83
Shell Oil Co., Inc., 5-20-41.

TEXAS GULF COAST GRAVITY TABLES

	(1)	(2)	(3)	(4)	(5)
Below 20	$1.06	$1.06	....	$0.98	$0.93
20-20.9	1.08	1.08	....	1.00	.95
Below 21	....	....	$1.08	....	....
21-21.9	1.10	1.10	1.10	1.02	.97
22-22.9	1.12	1.12	1.12	1.04	.99
23-23.9	1.14	1.14	1.14	1.06	1.01
24-24.9	1.16	1.16	1.16	1.08	1.03
25-25.9	1.18	1.18	1.18	1.10	1.05
26-26.9	1.20	1.20	1.20	1.12	1.07
27-27.9	1.22	1.22	1.22	1.14	1.09
28-28.9	1.24	1.24	1.24	1.16	1.11
29-29.9	1.26	1.26	1.26	1.18	1.13
30-30.9	1.28	1.28	1.28	1.20	1.15
31-31.9	1.30	1.30	1.30	1.22	1.17
32-32.9	1.32	1.32	1.32	1.24	1.19
33-33.9	1.34	1.34	1.34	1.26	1.21
34-34.9	1.36	1.36	1.36	1.28	1.23
35-35.9	1.38	....	1.38	1.30	1.25
36-36.9	1.40	....	1.40	1.32	1.27
37-37.9	1.42	....	1.42	1.34	1.29
38-38.9	1.44	....	1.44	1.36	1.31
39-39.9	1.46	....	1.46	1.38	1.33
40 and above	1.48	....	1.48	1.40	1.35

TEXAS GULF COAST GRAVITY TABLE EXPLANATION

Column 1:
Humble Oil & Refining Co., 5-21-41, in-

cludes Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa (new), Raccoon Bend, South Thompson, Sugarland, Thompson, and Webster fields.

Stanolind Oil & Gas Co., 5-21-41, includes West Beaumont, High Island, and Spindletop.

Sinclair Prairie Oil Marketing Co., 5-21-41. Stanolind Oil Purchasing Co., 4-9-42, includes Clinton and Lake Creek.

Pure Oil Co., 4-21-41, includes Louise and Ganado.

Gulf Refining Co., 5-21-41, includes Spindletop, Sour Lake, Lovells Lake, West Beaumont, Goose Creek, South Liberty, Big Creek, Blue Ridge, Fannett, Moore, Barbers Hill, Hankamer, Thompson, Lochridge, Dyersdale, and Hull (old).

Sun Oil Co., 5-21-41, includes Barbers Hill, Batson (old), Bayou Blue, Chacahoula, Cotton Lake, Esperson (below 35° gravity), Fausse Point, Goose Creek, Greens Lake, Hackberry (east and west), Hull (below 25°), Humble (below 35°), Nome, North Dayton (below 25°), Orange, Saratoga, Sour Lake, South Liberty, and Vinton.

Column 2:

Texas Co., 5-21-41, includes Arriola, Ganado, Hamman, Hillje, Humble, Kubela, Magnet, Manvel, Markham, Mauritz, Old Ocean, Pickett Ridge, Port Neches, Sour Lake, West Columbia, and Withers.

Column 3:

Pan American Production Co., 5-21-41, includes Hastings and South Houston.

Stanolind Oil & Gas Co., 4-1-41, includes High Island, Spindletop, Hastings, and South Houston.

Column 4:

Humble Oil & Refining Co., 5-21-41, includes Anahuac, Angleton, Cedar Point, Fishers' Reef, Hull (new and old), Pierce Junction, Red Fish Reef, and Turtle Bay.

Gulf Refining Co., 5-21-41, includes Anahuac, Hull (new), Thompson (deep), Pierce Junction, and Orange.

Sun Oil Co., 5-21-41, includes Anahuac, Caplen and Turtle Bay.

Humble Oil & Refining Co., 3-29-41, includes Dickinson, Gillock, Hardin, League City, and Rowan.

Pure Oil Co., 2-23-43, at Alief field.

Column 5:

Pan American Production Co., 5-21-41, includes Gillock, except scale starts at 95 cents below 21°.

Stanolind Oil Purchasing Co., 5-21-41, includes Fairbanks, North Houston, and Roslyn.

Continental Oil Co., 6-16-43.*

Phillips Petroleum Co., 6-16-43.*

*Starts at $1 for 29-29.9.

Column 5 Winkler and Lea:

Stanolind Oil & Gas Co., 5-21-41, includes Winkler County only.

Gulf Refining Co., 5-21-41, includes Lea County, New Mexico, only.

Column 6 Gray County:

Texas Co., 6-16-43.

H. F. Wilcox Oil & Gas Co., 6-16-43.

Column 7 Lea County:

Magnolia Petroleum Co., 5-21-41.

Column 8 Eddy County:

Continental Oil Co., 5-30-41.

Column 9:

Shell Oil Co., Inc., 5-20-41, includes Crane, Ector, Howard, Glasscock, Upton, Winkler, and Yoakum counties, Texas, and Lea County, New Mexico.

Column 10 Texas Panhandle:

Humble Oil & Refining Co., 6-16-43.

Gulf Refining Co., 6-16-43.

Column 11 Panhandle:

Sinclair Prairie Oil Marketing Co. 6-16-43.

WEST TEXAS, PANHANDLE, AND NEW MEXICO GRAVITY TABLES

	1	2	3	4	5	6	7	8	9	10	11
Below 20	$0.70								$0.70	$0.80	
20-20.9	.72								.72	.82	
21-21.9	.74								.74	.84	
22-22.9	.76								.76	.86	
23-23.9	.78		$0.78						.78	.88	
24-24.9	.80		.80						.80	.90	
Below 25		$0.80					$0.80				$0.90
25-25.9	.82	.82	.82		$0.82		.82		.82	.92	.92
26-26.9	.84	.84	.84		.84		.84		.84	.94	.94
27-27.9	.86	.86	.86		.86		.86		.86	.96	.96
28-28.9	.88	.88	.88	$0.98	.88		.88	$0.88	.88	.98	.98
29-29.9	.90	.90	.90	1.00	.90		.90	.90	.90	1.00	1.00
30-30.9	.92	.92	.92	1.02	.92		.92	.92	.92	1.02	1.02
31-31.9	.94	.94	.94	1.04	.94		.94	.94	.94	1.04	1.04
32-32.9	.96	.96	.96	1.06	.96		.96	.96	.96	1.06	1.06
33-33.9	.98	.98	.98	1.08	.98		.98	.98	.98	1.08	1.08
34-34.9	1.00	1.00	1.00	1.10	1.00	1.10	1.00	1.00	1.00	1.10	1.10
35-35.9	1.02	1.02	1.02	1.12	1.02	1.12	1.02	1.02	1.02	1.12	1.12
36-36.9	1.04	1.04	1.04	1.14	1.04	1.14	1.04	1.04	1.04	1.14	1.14
37-37.9	1.06	1.06		1.16	1.06	1.16		1.06		1.16	1.16
38-38.9	1.08	1.08		1.18	1.08	1.18		1.08		1.18	1.18
39-39.9	1.10	1.10		1.20	1.10	1.20		1.10		1.20	1.20
40 and above	1.12	1.12		1.22	1.12	1.22		1.12		1.22	1.22

WEST TEXAS, PANHANDLE AND NEW MEXICO TABLE EXPLANATION

Column 1:

Humble Oil & Refining Co., 5-21-41, includes Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler, and Yoakum counties, West Texas, and Lea County, New Mexico.

Gulf Refining Co., 5-21-41, includes Crane, Ector, Upton, Ward, and Winkler counties, West Texas.

Stanolind Oil Purchasing Co., 5-1-43, at Slaughter and Cedar Lake.

Column 2:

Sinclair Prairie Oil Marketing Co., 5-21-41, includes West Texas and Lea County, New Mexico. Effective 5-29-41, in Eddy County, New Mexico.

Magnolia Petroleum Co., 5-21-41, includes Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum and Gaines counties.

Column 3:

Texas Co., 5-21-41, includes Crane and Winkler counties, Texas, and Lea County, New Mexico.

Column 4 Texas Panhandle:

Magnolia Petroleum Co., 6-16-43.

EASTERN STATES

Pennsylvania and Ohio

South Penn Oil Co.:
- National lines, 3-26-42 ..... $3.00
- Southwest Penn, 3-26-42 ..... 2.65
- Eureka lines, 3-26-42 ..... 2.59
- Corning grade, 5-27-41 ..... 1.31

Tide Water Associated Oil Co.:
- Bradford, 3-26-42 ..... $3.00
- Allegany, N. Y., 3-26-42 ..... 3.00

Pennzoil Co.:
- Group A, 3-26-42 ..... $2.93
- Group B, 3-26-42 ..... 2.92
- Group C, 3-26-42 ..... 2.91
- Group D, 3-26-42 ..... 2.90
- Group E, 3-26-42 ..... 2.88

Quaker State Oil Refining Corp.:
- In Buckeye lines, 3-26-42 ..... $2.55
- In Eureka lines, 3-26-42 ..... 2.59

Kentucky

Ashland Oil & Transportation Co., 6-19-41:
- Big Sandy River $1.38
- Kentucky River 1.43

Sohio Corp., 5-21-41:
- Birk City $1.33

West Virginia

Pure Oil Co.:
- Cabin and Kelly Creek, 3-27-42 ..... $2.50

MIDDLE WEST FLAT PRICES

Illinois and Indiana

Ohio Oil Co.:
- Illinois basin, 5-21-41 ..... $1.37
- Eastern Illinois, 5-21-41 ..... $1.22
- Western Indiana, 5-21-41 ..... 1.23

Magnolia Petroleum Co.:
- Illinois basin, 5-21-41 ..... $1.37

Carter Oil Co.:
- Illinois (Louden), 5-21-41 ..... $1.37

Sohio Corp.:
- Illinois basin, 5-21-41 ..... $1.37

Texas Co.:
- Illinois basin, 5-21-41 ..... $1.37

(Continued on Page 127)

STANDARD OIL CO. OF CALIFORNIA CRUDE-OIL PRICES EFFECTIVE APRIL 1, 1943

Gravity	Signal Hill (Long Beach)	Wilmington	Seal Beach	Huntington Beach	Inglewood	Olinda-Brea Canyon	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview area	Coalinga	Kettleman Hills	Elwood Terrace
14-14.9	....	$0.93	....	$0.96	....	$0.95	$0.95	$0.95	$0.95	$0.97	....	....	....	....	....	$0.98	$0.98	....	....
15-15.9	....	.96	....	1.00	$1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
16-16.9	..	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
17-17.9	....	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
18-18.9	$0.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
19-19.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	$0.98	.98	.98	....	....
20-20.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
21-21.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
22-22.9	.96	.98	$0.88	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
23-23.9	1.00	1.02	.92	1.02	1.01	.98	.97	.98	1.00	.97	....	....	....	....	.98	.99	.98	....	....
24-24.9	1.03	1.06	.97	1.05	1.04	1.01	1.01	1.02	1.03	.97	$0.99	....	....	....	.98	1.03	.98	....	....
25-25.9	1.07	1.09	1.01	1.08	1.07	1.04	1.05	1.06	1.07	.98	1.02	....	....	....	.98	1.07	.98	....	....
26-26.9	1.11	1.12	1.06	1.11	1.10	1.08	1.09	1.10	1.11	1.01	1.06	....	....	....	.98	1.11	.98	....	....
27-27.9	1.15	1.15	1.10	1.14	1.14	1.11	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	.98	....	....
28-28.9	1.18	1.18	1.15	1.17	1.17	1.14	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.00	....	....
29-29.9	1.20	1.21	1.19	1.20	1.20	....	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.02	....	....
30-30.9	1.23	1.24	....	1.23	1.22	....	....	....	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.04	....	f.o.b.
31-31.9	....	....	....	....	1.24	....	....	....	....	1.19	1.24	1.19	1.04	1.12	1.14	....	1.06	....	ship
32-32.9	....	....	....	....	....	....	....	....	....	1.23	1.28	1.23	1.07	1.14	1.17	....	1.09	....	....
33-33.9	....	....	....	....	....	....	....	....	....	1.27	....	1.26	1.10	1.17	....	....	1.11	....	$1.22
34-34.9	....	....	....	....	....	....	....	....	....	1.31	....	1.30	1.13	1.20	....	....	1.13	....	1.25
35-35.9	....	....	....	....	....	....	....	....	....	1.35	....	....	1.16	1.22	....	....	....	$1.23	1.28
36-36.9	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	1.26	....
37-37.9	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	1.29	....
38-38.9	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	....
39-39.9	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	....
40-40.9	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	....

Standard posts 94 cents for 12 gravity and 96 cents for 13 gravity in San Joaquin fields, effective May 25, 1943.

NORTH LOUISIANA

Gas-Distillate Field Is Extended Into Bossier

THE Lake Bistineau gas field was extended 2½ miles west, across the river into Bossier Parish last week when Electric Oil & Gas Co. 1 Lake Bistineau was completed flowing 50,000,000 cu. ft. of gas and distillate. Pay zone is the Pettit lime at 5,220-70 ft. R. O. Roy, driller of the extension, applied for permit to drill the second well in the NE NE NW 6-16n-10w. The new well will be in search of shallow production in the Woodbine.

NORTH LOUISIANA COMPLETIONS

Wildcat, Catahoula Parish: California Co. 1 Eckhardt, NE NE 12-9n-7e, dry, T.D. 5,860 ft.

Calvin, Winn Parish: H. L. Hunt F-28 Goodpine, NE SW 24-12n-5w, dry, T.D. 6,344 ft.

Hosston, Caddo Parish: Bayou State Oil Corp. 14-B Jolley, N½ NW SE 21-22n-15w, pumped 8 bbl., Nacatoch 1,046-64 ft.

Monroe, Morehouse Parish: Union Producing Co. 36 Tensas Delta, SE NE NE 27-22n-4e, 1,424,000 cu. ft. gas, gas rock 2,141-2,205 ft.

Monroe, Union Parish: J. E. Farrell 5 Union Steel, W½ SE SW 26-20n-3e, 15,088,000 cu. ft. gas, gas rock 2,118-58 ft.

ARKANSAS COMPLETIONS

Wildcats

Columbia County: J. R. Hayden 1 Runyan, NW NW 14-16s-21w, dry, T.D. 7,659 ft.

Ouachita County: DeKalb Agricultural Assn. 1 H. L. Berg, SW NW 31-13s-16w, dry, T.D. 4,076 ft.

Fields

Hillsboro, Union County: Hunt Oil 3 Burnside, SW NW NW 19-18s-13w, pumped 10 bbl., Nacatoch 2,277-2,300 ft., T.D.

New London, Union County: Marine Oil 8 Frost, NW SE 12-18s-12w, flowed 200 bbl., Cotton Valley 5,688-5,700 ft., T.D. 5,843 ft.

Stephens, Columbia County: G. H. Vaughn 1 E. H. Harrell, SW SW NW 10-15s-20w, pumped 15 bbl., lower Tokio 2,525-36 ft., T.D. 2,563 ft.

MISSISSIPPI

JACKSON, Miss. — Two new oil fields for Mississippi were in prospect this week, in the light of reports from wildcat tests on opposite sides of the state. In Wayne County, on the eastern border, Gulf Refining Co. 1 Aden Davis, 2-9n-9w, was said to have encountered an oil show in the massive Tuscaloosa, topped at 6,700 ft. At the close of the week it was coring at 6,760 ft.

The California Co.'s 1 Natural Gasoline Co. of Louisiana, Inc., in irregular section 52-7n-1w, Adams County, and 16 miles east of Natchez, was drilling at 8,265 ft. after showing oil in cores in the Wilcox between 4,000 and 4,200 ft. The state at present has no Wilcox sand production. This test is approximately 15 miles east of Pure Oil 1 McDowell which produced high-gravity oil under heavy gas pressure at 10,280-85 ft. until tests at lower levels ruined the hole and whipstock operations were started. The Pure well is now shut down due to high water from the Mississippi River.

MISSISSIPPI COMPLETIONS

Hinds County: Plains Prod. Co. 1 J. S. Taylor, NW SE 14-5n-2w, dry, T.D. 7,560 ft. W. L. Goldston 1 F. Hall, NW SW 36-8n-3w, dry, T.D. 6,872 ft.

Madison County: Phillips Pet. Co. 2 G. E. Maley, SW NE NW 4-11n-4e, dry, T.D. 5,050 ft.

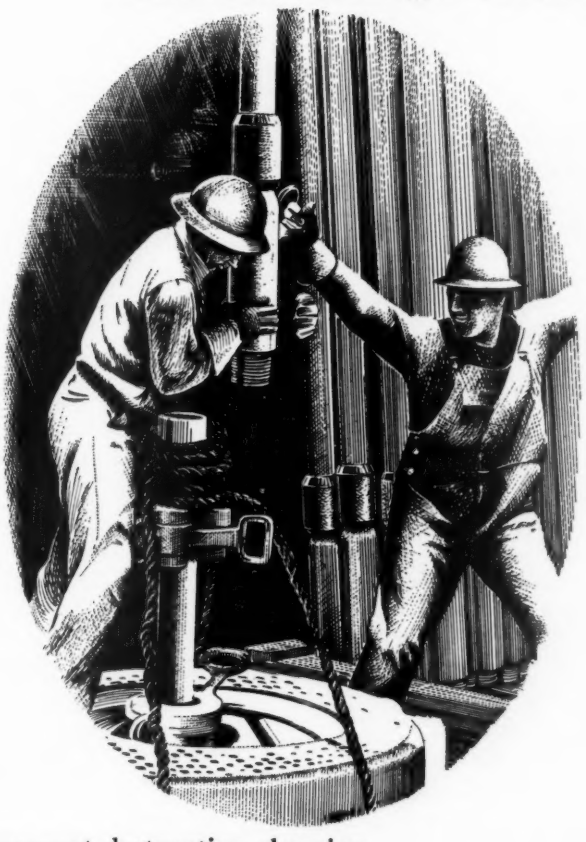
War Standards Stressed in Newly Issued A.S.A. List

A special section on War Standards is included in the new List of Standards just issued, and which will be sent on request by the American Standards Association, 29 West Thirty-ninth Street, New York City. The A.S.A. is under contract with the federal Government to carry on the work of standardizing specifications, methods, etc., as part of the war program.

Another special section is devoted to American Safety Standards, an important phase of war production, the conservation of manpower and the reduction of absenteeism when the latter is due to accidents.

More than 600 standards are listed, standards which represent general agreement between maker, seller and user groups. They cover every phase of American industry.

The *right* way to install drill pipe —always with a Patterson-Ballagh Protector



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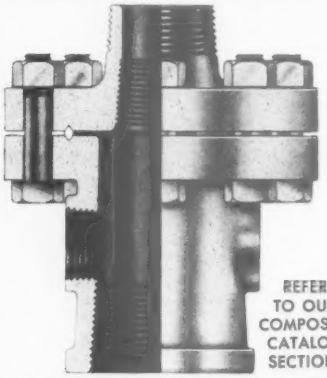

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Among the Drilling Contractors

Loffland Brothers, Tulsa, have the contract for a test on the South Douglas Creek or Red Rock structure in Rio Blanco County, Colorado. The well is Superior Oil Co. of California 1 Dore, NE NE SE 13-4s-102w, and is 7 miles south of the recent gas discovery on Douglas Creek.

Manning & Brown, Inc., Denver, Colo., will drill Continental Oil Co. 1 Gebo unit on the Gebo dome, Hot Springs County, Wyoming. Location is SW NW SE 23-44n-95w. It will probably be carried to the Tensleep at around 7,000 ft.

Harry L. Edwards Drilling Co., Houston, Tex., drilling contractor, has the contract for a 10,500-ft. test, the Pan American Production Co. 2 Peters in the South Gillock area, between Dickinson and Texas City, Galveston County, Texas.

George P. Livermore, Inc., Lubbock, Tex., has contract to drill 5,000-ft. wildcat test in southwest Dawson County, Texas, for Darby Petroleum Co. 1 Annie Harris, in Labor 16, League 268, Moore County School Land.

Gwynn & Overby, Wichita Falls, Tex., have moved in on a 6,000-ft. wildcat test in Young County, Texas, Section 461, T.E.&L. Survey, 7 miles northwest of Graham, for Hanlon-Buchanan, Inc., and Auto-Ordnance Co. of Dallas 1-F B. W. King.

Lon H. Cron, Houston, Tex., is rigging up at 1 J. S. Millenger, 2½ miles northwest of Aldine, Harris County, Texas, a wildcat test for Continental Oil Co. For Continental also Cron has started drilling 20-B Driscoll, in the Conoco-Driscoll field of Duval County, Texas.

Reading & Bates, Odessa, Tex., have finished three wells for Stanolind Oil & Gas Co. on the Midland Farms Co. lease in the North Cowden pool of Ector County, Texas.

Commerce Oil Co., Houston, Tex., was setting surface pipe last week at 4 Mullins, in the Boling field, Wharton County, Texas, for Danciger Oil & Refining Co.

Davidson Drilling Co., Fort Worth, Tex., has finished Stanolind Oil & Gas 10-E State, South Lovington pool, Lea

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County, New Mexico, and is drilling on a 4,500-ft. test for the same company in the North Cowden pool of Ector County, Texas. It has moved in on Stanolind 4 Byrd in the Byrd pool of Ward County, which is producing from about 2,700 ft.

C. I. Drilling Corp., Houston, Tex., was drilling below 5,000 ft. at Schlicher-Thomas Co. Bash-Johnson unit 1, for Gulf Refining Co., in the Pine Prairie field, Evangeline Parish, Louisiana.

Arrow Drilling Co., Houston, Tex., completed a dry hole at 8,892 ft. at 4 South Coast, in the Charenton Beach area of St. Mary Parish, Louisiana, for Fifteen Oil Co. A workover for the same company of 2 South Coast, in the Charenton Beach area, failed to revive commercial production, and the well was abandoned.

H. C. Williams has been awarded contract to drill the Charles J. Smith 1 John VanDenBeldt, in NW NE NW 13-4n-15w, Allegan County, Michigan.

Wright Drilling Co., Houston, Tex., has started work on 2 Lundy, in the West Mauritz field of Jackson County, Texas, for Lewis Crouch. As the week closed, Wright was trying to open production at 1 Anna Skarda, in the North McFaddin area of Victoria County, Texas, a joint operation of Wright and Barnsdall Oil Co. This contractor recently completed a workover of John B. Coffee 3-B Mauritz, in the West Mauritz field.

Muskegon Development Co. will drill Gulf Refining Co. 1 Anna Ruegsegger, in C N½ NW SE 3-14n-4e, Bay County, Michigan. The company has contract also on Regal Dutch Petroleum Co. 2 Gerritt, Bosch and Herman Walters, in C SW SE 36-5n-15w, Ottawa County, Michigan.

Voorhees Drilling Co. has been granted contract to drill the William T. Colvin, Jr., 1 A. E. Homer (Comm.), in N½ SE NW 25-5n-1w, Clinton County, Michigan.

J. C. Arthurs, Inc., will drill Freeman Oil Co. 1 Bertha, Hart, Hicks et al, in C S½ SE SE 5-12n-4w, Gratiot County, Michigan.

Ashby Drilling Co. will drill Ohio Oil Co. 3 Swanson, Modrow, Altman, Smith, in C SE 20-15n-11w, and Ohio Oil Co. Keilholtz et al Unit 4, in C SW 21-15n-11w, Newaygo County, Michigan.

Fisher-McCall Oil & Gas Co., Inc., has the contract to drill Socony-Vacuum Oil Co., Inc., 1 Wallace, Pandol, Brant and Batka (Comm.) in SW NE NW 9-2s-16w, Van Buren County, Michigan.

George Kernodle has contract to drill Central Development Co. 1 R. A. Barker, in SE NE NW 19-2s-16w, Van Buren County, Michigan.

Olson Drilling Co. has the contract for Atlantic Oil Corp. 1 Randall, a Harvey County, Kansas, wildcat in CEL SW NE 23-11-3w, midway between the Burrton and Voshell pools on the west and the Halstead area on the east. Production will be sought in the Arbuckle, expected at about 3,150 ft.

Wise Drilling Co. has the contract on the V. G. Schimmel et al 1 Schimmel fee, in Share 3, Porcion 27, Zapata County, Texas, and was moving in to start rigging up for a 3,100-ft. test.

Noble Drilling Co. will drill Ohio Oil Co. 3 O. E. Boettcher in C S½ SE SW 28-18n-9w, Osceola County, Michigan.

Parker Drilling Co., Tulsa, has been awarded contract on Carter Oil Co. 1 Johnson ranch, C SW NE 13-8n-4e, in the Blanchard sector of McClain County, Oklahoma. The Wilcox sand is expected below 10,000 ft.

Stuart Merrill has contract to drill Frank Norton and Roy G. Mell 1 Leland Watrous et al, in C E½ SW SE 30-14n-8e, Tuscola County, Michigan.

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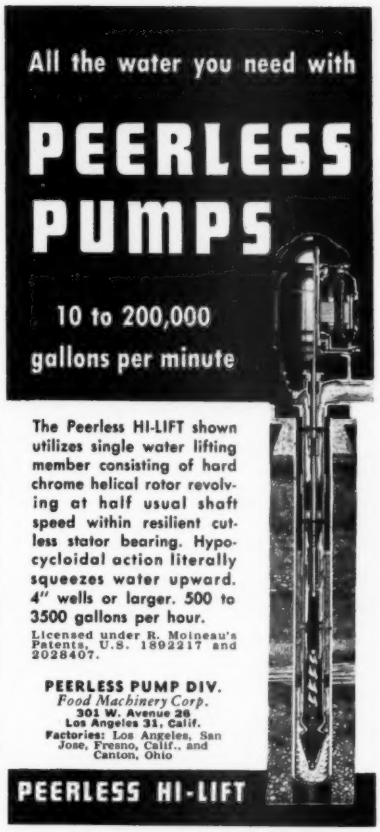
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IN PEACE—IN WAR

'BESTOLIFE Lead Seal Joint Compound has been used successfully in the Oil and Refining industries for the past fifteen years. During that time, it has proved itself *superior* in protecting threads and in providing tight joints which can be broken out easily.

Today, 'BESTOLIFE has enlisted in the Navy, Merchant Marine and Defense Plants for the duration, and we are proud of this assignment to help in the Victory effort.

But there are still ample stocks of 'BESTOLIFE available on any priority rating, at supply house field stores in every drilling district in the United States and Canada. Use 'BESTOLIFE Tool Joint Compound for *best* results!

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LOS ANGELES, CALIFORNIA

PERSONALS

M. F. KAHLE

Foreign Engineering Paved Way to Post On Carter Staff

FOREIGN engineering service in Mexico and Venezuela feature the experience background of Loren F. Kahle who recently joined the executive staff of the Carter Oil Co., Tulsa.

He has served Standard Oil Co (New Jersey) operating subsidiaries since 1924 when he accepted employment as a laborer in the manufacturing branch of the organization at Bayway, N. J. He was transferred to Standard Oil Development Co.'s department of engineering training and, in 1925, went to Tampico, Mexico, as engineer for Cia. Transcontinental de Petroleo. He was promoted to assistant chief engineer of the Mexican company in 1927 and became chief engineer in 1929.

Mr. Kahle transferred to Caripito, Venezuela, as chief engineer for Standard Oil Co. of Venezuela in the fall of 1935 and remained in that position until December 1941, when he became operating superintendent of the company's Caripito terminal. During the past 5 months, he was loaned by Standard of New Jersey to the U. S. Navy to do special consulting work.

He was born at Toronto, Canada, December 31, 1903, and the family moved to Oklahoma City, Okla., in 1910. He attended public schools in Oklahoma and graduated with a degree of bachelor of science in mechanical engineering from Iowa State College in 1924. He married Helen Herr of Calmar, Iowa, in 1927, and the couple now has three sons.

E. C. Casey, employed in the land department of Shell Oil Co., Inc., Houston, Tex., has been made district land agent in Tyler, Tex., taking the place of **H. W. Sharp,** who resigned. **E. J. McLain** was moved from Shreveport, La., to take Mr. Casey's place, and **E. C. Abell,** Houston, replaced Mr. McLain in Shreveport.

Ensign T. O. Bratten, of the U. S. Naval Air Corps and formerly in the geologic, lease and scouting department of Humble Oil & Refining Co., Houston, Tex., at latest report was piloting a Douglas dive bomber off an aircraft carrier on patrol duty in the Atlantic.

Frank Stice, drilling contractor of Beeville, Tex., has received word from War Department that his only son, Lt. Dale V. Stice, was killed in action May 29. Mr. Stice, who had received a letter from his son, an infantry officer, a few days after the invasion of Attu, believes the young man met death at the hands of Japanese snipers.

Capt. Joe T. Dickerson, general attorney for Shell Oil Co., Inc., in the Texas-Gulf area, had been assigned to the intelligence office of a bombardment group at Gowen Field, Idaho, according to a recent report, but expected to be transferred soon for further training. After spending several months in Army schools in Miami, Fla.; Washington, D. C., and Harrisburg Pa., he expressed gratification over receiving active field assignments.

Edgar H. Fallin, newly appointed representative for the Pennsylvania Grade Crude Oil Association on the Pacific Coast, is now enroute to California and will shortly take up his new duties in Los Angeles. He joined the association staff last month. He spent several weeks in Oil City and State College in special training for his new work. Mr. Fallin has had considerable business experience of varied nature, including a number of years spent in the oil industry. He was once employed by Penn Well Lubricants Co. in New Jersey. Later he was with the Shell Oil Co., Inc., as manager of eastern Pennsylvania territory for a time.

Capt. Raymond P. Ketelsen, Houston, Tex., who led a flight of planes in the recent bombing of the Gnome - Rhone Aero factory in Le Mans, France, was an oil-field worker and is a son of **R. W. Ketelsen,** Texas manager for J. G. Beard Drilling Co., Duncan, Okla. "We made a pile of brick out of that airplane factory," reported Captain Ketelsen, who had been overseas only a month. He had been in the air forces since October 1940 and was an instructor at Bakersfield, Calif., for a year. While a student at Texas A. & M. College he ranked high in the military training course. He worked with drilling crews in East Texas during vacations.

L. M. Carson, formerly superintendent of refined oils for Texas Co. (China), Ltd., in Shanghai, China, is now serving the U. S. Government in the Board of Economic Warfare, Washington, D. C.

John Visconti last week celebrated 50 years of service in the boiler shop of the Whiting, Ind., refinery of Standard Oil Co. (Indiana). He started there as a water boy in 1893, at 12 years of age, and never worked anywhere else. In honor of his golden anniversary the directors bought him a gold watch. Presentation was made at a special ceremony at the Chicago general office by **Dr. M. G. Paulus,** vice president in charge of manufacturing.

C. E. Corbin, Heath, Ohio, has been appointed temporary assistant maintenance foreman of Pure Oil's refinery near that city, pending return of **R. K. Graham.**

Jack Seagraves, Fort Worth, Tex., has been employed as a petroleum engineer in the Shreveport, La., operating office of the Ohio Oil Co. The engineering department there is headed by **D. W. Akins, Jr.**

J. Frank Tindol has been made district petroleum engineer for Texas Co., and is located at Daisetta, Tex.

SCHEUMANN

W. W. Scheumann, who has been general superintendent of refineries for the Cities Service Oil Co. (Delaware) at Bartlesville, Okla., has been transferred to the Cities Service Oil Co. (Pennsylvania) and will be located at the new refinery which that company is building at Lake Charles, La. For the present, he will have charge of the chemical work at the Lake Charles refinery. Mr. Scheuman has been succeeded by **F. M. Simpson** who has been connected with the Cities Service organization for the past 17 years, starting as processing engineer. Mr. Simpson's headquarters will be at Bartlesville.

John Van Sant, of Huber Co., last week was elected president of the Panhandle Geological Society, Amarillo, Tex. Other officers elected are **A. B. Van Tine,** Gulf Oil Corp., vice president, and **Dick Wagner,** Pure Oil Co., secretary-treasurer.

Dale D. Kerstetter, who was a geological engineer with Standard Oil Co. of Venezuela, is working as assistant physicist in the Naval Ordnance Laboratory, Navy Yard, Washington, D. C.

George L. Yates has resigned as assistant professor at University of Pittsburgh, and is now with Kingwood Oil Co., Effingham, Ill., as petroleum engineer.

Albert P. Kleeman, formerly manager and vice president of Franco Western Oil Co., is petroleum engineer and geologist with McElroy Ranch Co., Crane, Tex.

Gilbert W. Noble has resigned as associate professor of petroleum engineering at Missouri School of Mines, to join the staff of Ohio Oil Co., at its Findlay, Ohio, office.

George Heseldin was recently appointed assistant general manager of Iraq Petroleum Co. He is located at Haifa, Palestine.

Dick Moore, petroleum engineer in the Marshall, Ill., area for the Ohio Oil Co., has been transferred to the company's operation office at Casper, Wyo. **Oscar Gram,** geologist, formerly stationed at Marshall, has been transferred to Wichita Falls, Tex. **G. F. Fix,** geologist, formerly in the Bloomington, Ind., office, was transferred to Marshall, replacing Mr. Gram. **M. M. Fidlar,** formerly in charge of the Bloomington geological office which has been discontinued, has been transferred to Rock Springs, Wyo.

R. W. Hendee, of Colorado Springs, Colo., District 4, chairman of the petroleum-industries committee on natural gas and natural gasoline; **Albert M. Ballard,** Denver, assistant director of the Natural Gas and Natural Gasoline Division of PAW, and **Robert L. Hazlett,** secretary of the industries committee, for District 4, attended a meeting of these committees at Billings, Mont. The purpose of the meeting was to discuss the possible exchange of natural gas to prevent the laying of any unnecessary pipe lines.

Fred Nicholas, superintendent of production for the Texas Co. in the Rocky Mountain district, has resigned to become president of the Nicholas Drilling Co., which will have its headquarters at Houston, Tex. He is suceeded by **M. L. Terry,** of the Oklahoma-Kansas division, in charge of the Illinois area.

Jack Simon, petroleum engineer for the Ohio Oil Co., has been transferred from Henderson, Tex., to the Rocky Mountain division and is now stationed at Rock Springs, Wyo.

Shifts: **E. H. Clingman,** superintendent, Fain Drilling Co., Beeville to Yorktown, Tex.; **R. V. Ewing,** geologist, Continental Oil Co., Morton, Tex., to Portales, N. M.; **R. W. Phillips,** engineer, Texas Pipe Line Co., Houma to Lafayette, La.; **E. A. Brown,** superintendent, Ohio Oil Co., Robinson, Ill., to Ashland Oil & Refining Co., Ashland, Ky.; **Willard M. Dow,** engineer, East Ohio Gas Co., Edgewater, Colo., to Seattle, Wash.; **H. B. Gernert,** superintendent, Texas Co., Hamilton, Colo., to Cut Bank, Mont.; **Earl E. Kleinman,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Borger, Tex.; **Howard B. Shelton,** engineer, Phillips Petroleum Co., Dewey, Okla., to Borger, Tex.

C. E. Shoenfelt, petroleum engineer, of Denver, Colo., who for several months underwent treatment in Barnes Hospital in St. Louis, Mo., for a serious illness, has fully recovered and returned to his offices in the Continental Oil building in Denver.

Daniel Dobler, superintendent of the Pacific Coast division marine department of Texas Co., has been elected vice president of the Propeller Club of the United States, Los Angeles-Long Beach Club No. 66.

Maj. J. Earle Brown, formerly consulting geologist and oil producer of Fort Worth, and past president of the Fort Worth Geological Society, has been appointed executive officer of the Army Air Base at Alamagordo, N. M. Major Brown was one of the first aerial photographic officers in World War 1, and served with the American Expeditionary Forces in France as commanding officer of the aerial-photo section of the Fiftieth Squadron.

Wesley Cunningham, treasurer of General Petroleum Corp., was the honored guest recently at a dinner given by his associates on the twenty-fifth anniversary of his service with General Petroleum Corp.

Thomas McManus, of Bakersfield, Calif., who is representing the San Joaquin Valley Oil Producers Association in Washington, was a recent visitor to California where he conferred with oil men in southern California before returning to the nation's capital.

Frank E. Lyons, formerly associated with Benedum & Trees Oil Co., Pittsburgh, Pa., has been appointed assistant secretary-treasurer of Brundred Oil Corp. with headquarters in Oil City, Pa. His predecessor in this office is **A. C. W. Smith** of Titusville, Pa., who has retired after 24 years' continuous service with the company.

Warren Burns, assistant to **W. H. Dodge,** director of PAW District 1, was scheduled to go into the U. S. Navy this week. Mr. Burns has been assistant to Mr. Dodge since the latter was appointed District 1 director, previously having served PAW in Washington, D. C.

Harvey D. Carter, president of the South Shore Oil & Development Co., and managing partner of Oil Trading Co., New York, was recently named director of the supply division in the District 1 office of the Petroleum Administration for War. His duties will embrace the coordination, direction and execution of plans for increasing the vital wartime supplies of petroleum and petroleum products to the East Coast district. Other oil-industry experience which Mr. Carter has had includes being assistant to the president of the Pierce Oil Corp. and owning his own business as a petroleum and shipping broker. From 1919 to 1921, Mr. Carter worked on tank steamer operations for the U. S. Shipping Board, both in Washington, D. C., and in New York City. At the time of his resignation he was manager of the tank steamer department. During World War I he served overseas with the U. S. Navy on board the famous torpedoed U.S.S. President Lincoln.

Market Developments

Mid-Continent

THE reduction of approximately 40,000 bbl. per day in the authorized rate of crude runs to stills in District 2 refineries during July, lowering the area's total quota to roughly 1,125,000 bbl. per day, emphasized the short position of charging stock in the Mid-Continent and Middle West manufacturing centers. Further emphasis was placed on the more restricted position of refiners in the central and Mid-Continent states by removal of all regulations on the percentage of motor fuel manufactured this month.

Most Mid-Continent refiners moved promptly to adjust their processing operations in order to recover the maximum volume of automotive gasoline consistent with contract commitments both for civilian and military products.

The reduction of 40,000 bbl. in crude-oil quotas assigned to District 2 refiners is in approximate balance with the shortage reflected during recent weeks. Even at the reduced rate of 1,125,000 bbl. per day, District 2 manufacturers will be forced to continue drafts on stored crude. The current pinch of crude supplies is, of course, more severe in certain plants than in others. Consequently, PAW removed all restrictions on the percentage of gasoline which operators may elect to manufacture. The lid was removed from motor-fuel production partially, PAW explained, to minimize the dislocation of agricultural supplies during this season of highest consumption.

Natural gasoline is in particularly strong demand for shipment to the East Coast. Prices are firm at unchanged quotations.

East Coast

NEW YORK.—The improvement in the East Coast oil supply situation which began in June has continued into July and, unless there is a relaxation in the restrictions on consumption, should continue indefinitely.

The fact that gasoline supplies have become comparatively strong was apparent over the recent July 4 holiday when consumption was negligible and service station stocks were more than adequate. The improvement in the gasoline position suggests that more emphasis is now due on heating-oil shipments since, despite the recent gains, stocks of all oils on the East Coast remain low. Building up of heating-oil stocks is necessary to prevent local shortages which occur despite the volume of shipments.

Rail shipments into the shortage area declined in the last week for which data are available. Total shipments approximated 987,221 bbl. per day but tank-car loadings were down 33,272 bbl. to 960,362 bbl. Box-car loading of 20,510 drums made up the balance. In spite of this decline the index of available supplies moved up two points, its most pronounced gain. This was the fourth successive week in which the index improved. If this rate of improvement is maintained stocks will reach last year's level by October 1 which, with the growth in deliveries to the area, will provide insurance against severe heating-oil shortages this winter.

Gulf Coast

HOUSTON, Tex.—It was not lack of tank cars, but lack of refinery products to put in them, that was causing uneasiness in the Gulf Coast territory this week. Extreme tightness prevailed in every corner of the market. Gasoline continued to head the list in point of scarcity. No changes in the prices that have ruled for weeks were reported, except that ⅛ cent more was being paid in some cases for 80-octane motor fuel.

According to reports, there still is a substantial number of tank cars in this region available for assignment. Refiners familiar with the facts declare there actually are not more cars than could be used if it were not for temporary maladjustments. They say that, notwithstanding the pronounced shortage of oil products for civilian use, there is material ready for shipment in every car reported idle. The difficulty, they say, lies in getting the car and the waiting load at the same point at the same time. A confused situation, it seems, has been caused largely by sudden countermanding of shipping instructions.

Contributing to the unusual tank-car situation are problems involved in working out shipping programs to comply with the recent PAW directive establishing zones in the six states comprising District 3 and laying down rules for distribution of gasoline so as to make the best and most economical use of transportation facilities.

Inquiry elicited no opinion that heavier tanker movement of oil products had afforded relief of such consequence as to provide an explanation, even in part, for such idle tank cars as are reported.

A.P.I. REFINERY REPORT

(Figures in thousands of barrels)

Week Ended July 3, 1943

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	145	2,301	546	1,058
Ind., Ill., Ky.	743	16,312	3,123	4,928
Okla., Kan., Mo.	339	6,229	1,634	1,894
Censored area*	1,866	31,133	12,493	14,131
Rockies	107	1,840	664	358
California	705	20,501	48,010	12,011
Total 7- 3-43	3,905	78,316	66,470	34,380
Total 6-26-43	4,015	79,589	67,960	34,044
Total 7- 4-42	3,552	86,660	77,401	33,022

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
July 3, 1943	240,927,000
June 26, 1943	242,657,000
July 4, 1942	253,280,000

*Excludes unrefinable stocks in California.

Pacific Coast

LOS ANGELES, Calif. — Fuel-oil stocks in Pacific Coast territory have shown substantial reductions during the past month indicating a higher demand. The ban against delivering fuel oil to new installations imposed by the petroleum administrator late in June will not have much effect in Pacific Coast states due to decreased building and the fact that most defense industries are already under operation. Fuel-oil stocks have been consistently reduced for the past 3 years and are reaching the point below which they should not be reduced. Although there are approximately 40,000,000 bbl. of fuel oil on hand in Pacific Coast territory it should be remembered that a substantial amount has been earmarked for military use and is therefore not available for commercial demand.

With a probable reduction in the amount of gasoline that can be sold facing the market later in the year, marketers have been giving consideration to the advisability of discontinuing indiscriminate sales of motor fuel for rebranding by retail outlets and the substitution of established refinery brands. Every indication points to the probability that distress gasoline will leave the market before the end of the year and be replaced with standard brands at higher prices.

Refinery Prices

(Prices as of July 13)

Quotations are f.o.b plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	†80	74-76	72-74	68-70	63-66
Mid-Continent*	.....	.....	5.875-6.000	.....	5.500-5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	.....	6.125-6.500	6.000-6.125	5.500-6.000	5.000-5.250

*Basis Group 3. †1939 C.F.R. (research method). ‡Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	4.125	.....

*Basis Oklahoma Group 3.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Residual Bunker C§
Mid-Continent*	4.125	.....	.....	.....	.....	$0.80-1.27
California	.....	2.750-4.000	.....	.....	‡1.35-1.45	0.85-1.00
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85-1.27
Northeast Coast	.....	.....	.....	6.800	2.780	1.65-2.07
North Louisiana	.....	.....	.....	.....	.....	0.80-1.27

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200. §Gravity range.

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.25	§1.10-1.15
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.875	4.650
North Texas	3.500	4.200
North Louisiana	3.625	4.350
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Neutral Oils

CALIFORNIA—		
Pale oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		37.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND
(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.50	10.50
Boston, Mass.	14.90	4.50	10.10
Burlington, Vt.	16.90	5.50	10.20
Buffalo, N. Y.	16.20	5.50	10.90
Dover, Del.	16.70	5.50	12.30
Hartford, Conn.	15.60	4.50	10.00
Manchester, N. H.	17.30	5.50	12.10
Newark, N. J.	15.20	4.50	10.00
New York, N. Y.	16.10	5.50	10.10
Philadelphia, Pa.	16.20	5.50	11.95
Pittsburgh, Pa.	16.70	5.50	12.30
Portland, Me.	16.30	5.50	10.20
Providence, R. I.	15.00	4.50	9.90
Washington, D. C.	15.20	4.50	11.30
Average 14 cities	16.02	5.14	10.85

(All prices undivided dealer basis.)

CENTRAL
(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich.	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind.	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN
(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla.	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	17.90	8.50	10.50
New Orleans, La.	17.75	8.50	*10.00
Norfolk, Va.	17.45	6.50	12.30
Average 11 cities	18.34	7.50	10.49

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN
(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST
(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Portland, Ore.	17.00	6.50	13.80
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.80
Average 3 cities	16.17	5.83	13.03
Average 50 cities	16.55	5.96	10.87

Kansas Fields

(Continued from Page 103)

gas, Mississippian lime 3,184-3,243 ft.

Van Lieu, Stafford County: Stanolind and Derby Oil 1 E. A. Van Lieu, NE NE SE 20-24-13w, dry, T.D. 4,169 ft., Arbuckle 4,156 ft.

Wilkens, Ellsworth County: Mid Plains 1 Bunce, N½ NW SE 24-17-10w, dry, T.D. 3,258 ft., Arbuckle 3,238 ft.

Vickers 2 Peterman, N½ SE NE 14-17-10w, dry, T.D. 3,282 ft.; Arbuckle 3,272 ft.

Williamson, Russell County: Skelly 1-E Boxberger, SW SW NW 2-14-14w, pumped 104 bbl., Lansing 2,972-81 ft., T.D. 3,268 ft.

Zenith-Peace Creek, Stafford County: Landon and Johnson 5 Volker, NE NE SW 1-24-11w, pumped 259 bbl., Viola 3,730-67 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—A third attempt to strike oil near where the Cities Service Oil Co. found pay in the Bartlesville sand at Tarkio, Mo., has resulted in failure. The latest attempt was by O. R. Newcomer of St. Joseph, who drilled 1 P. R. Low in SW NW NW 9-64n-39w, Atchison County, Missouri. Elevation was 979 ft. and total depth was 1,403 ft. This test was 1 mile east of his 1 Acock dry hole, which was 2 miles south of the producer. J. E. Palensky had a dry hole about 4 miles southwest of the producer.

Clifton Gall and Edwin S. Towle found no oil in the Hunton limestone at their 1 A. G. Allerton wildcat in SW NE 26-1s-16e, Brown County, Kansas, northwest of Hiawatha. The lime was topped at 2,685 ft.

NEBRASKA COMPLETIONS

Furnas County: Stanolind Oil & Gas 1 Vern Harding, NE NE SE 31-3n-25w, dry, T.D. 3,422 ft.

IOWA COMPLETIONS

Mills County, S of Henderson: F. O. Akin et al 1 H. A. Paul, SW SW SW 15-73n-40 w, dry, T.D. 2,834 ft.

Rocky Mountain Area

(Continued from Page 94)

It previously had a show of oil at 4,761-4,779 ft., in a sand, believed to be the Cut Bank, topped at 4,752 ft.

Tensleep test at Gebo.—Continental Oil Co. has released a location for its 1 Gebo unit, SW NW SE 23-44n-95w, on the Gebo dome, Hot Springs County, Wyoming, which will go to the Tensleep. This is one of the numerous structures in the Big Horn basin which have been known for many years but never tested to the horizons which now are highly productive. It was reported upon by Hewett & Lupton in Bull. 656 of the U. S. Geological Survey in 1917. The new location is 3 miles southeast of an old test drilled by the Ohio Oil Co. which wento the the Frontier at 2,000 ft. and near a well drilled in 1926 which went to the Morrison. The structure is a dome on the northwest half of the Lucerne anticline, a fold approximately 13 miles long. It is 12 miles east of the Hamilton dome, which produces from the Embar-Tensleep, and 18 miles southeast of Grass Creek.

Testing show in Dupuyer district.—Northern Ordnance, Inc., 1 Jannusch, NE SE 13-28n-7w, Dupuyer district, Pondera County, is reported to have had a good show of oil in the top of the Madison lime at 3,741 ft., total depth, and has run casing and tubing to acidize and test. Some old wells in the district had shows for around 600 ft. of oil in the Madison before the days of acidization and at the time were considered uncommercial, but now wells with that quantity of oil in the hole often are made into good producers. Location is on a Carter Oil Co. block of 150,000 acres, which lie to the south of a block of 85,000 acres held by the Texas Co. It is approximately 8 miles southeast of 1 Kingsbury, drilled by the Texas Co. last year. Exploration in the area primarily has for its objective the location of the shore line which is productive in Cut Bank.

California Fields

(Continued from Page 95)

and some suspect production may be developed beneath the Newport tidelands which incidentally are controlled by the city of Newport and not by the State of California as is the case in so many other productive fields. It is not at all improbable that at least one well will be drilled into the Newport tidelands in the near future if this is mechanically possible to do considering the comparatively shallow depth at which production is secured and the fact that wells must have a surface location at a considerable distance back of the tide line.

Los Angeles County.—Standard Oil has acquired the Goff lease from Ohio Oil Co. in the El Segundo field and has staked tentative location for 13 Goff near Ohio's old 8 Goff. The oil sands in the El Segundo field have reached the depleted stage and Standard's well will be drilled in search of the shallow gas sand. If a sufficient amount of natural gas can be developed, Standard could use it at its El Segundo refinery, part of which lies within the limits of the El Segundo field. There have been several severe blowouts from the upper gas sand during the life of the field and it is possible there is enough gas left to justify its production. The proposal to permit drilling operations at selected spots within the corporate limits of metropolitan Los Angeles has again been delayed while those in charge play some additional politics. As a result of this action the projected deep test of W. C. McDiffie and associates as well as the deep test scheduled to be drilled by the Beverly Oil Co. are held up. Seaboard was granted authority to drill by whipstocking beneath the Elysian Park a few weeks ago but the mayor vetoed the measure and thus no work can be started.

LOS ANGELES BASIN COMPLETIONS

Brea Olinda, Orange County: Union 78 Stearns, 7-3s-9w, pumped 145 bbl., 19.6-gravity, 1.2 per cent cut, 112,000 cu. ft. of net formation gas, T.D. 3,965 ft., P.B. 3,575 ft., perf. 2,933-3,573 ft., completed in lower Stearns zone of Pliocene age.

Huntington Beach, Orange County: D. D. Dunlap, 20 H.B., 1-6s-11w, dry, T.D. 3,770 ft.

Southwest Exploration Co. 10-J State, 3-6s-11w, flowed 345 bbl., 18.6-gravity, 2 per cent cut, 260,000 cu. ft. gas, 14/64-in. bean, T.D. 3,490 ft., perf. 2,390-3,484 ft., Huntington Beach tideland zone of Miocene age.

Montebello, Los Angeles County: Standard 106 Baldwin 2-2s-12w, pumped 29 bbl. net, 19.8-gravity, 50 per cent cut, T.D. 2,695 ft., perf. 2,459-2,693 ft., upper Baldwin zone of Pliocene age.

Torrance, Los Angeles County: Lebow & Nee, 10 Dominguez Estates, 5-4s-14w, pumped 70 bbl., 15.1-gravity, 4 per cent cut, T.D. 3,687 ft., perf. 3,193-3,273 ft., 3,353-3,677 ft., Ranger zone of Pliocene age.

Texas 9 Oakley, 30-4s-13w, pumped 60 bbl., 17.8-gravity, 4 per cent cut, T.D. 3,679 ft., perf. 3,577-3,670 ft.

COASTAL DISTRICT

Santa Barbara County. — Pacific Western Oil Co. completed an excellent flowing well in the West Cat Canyon field of Santa Barbara County and the crew from this well has been moved to 23 Los Alamos which is being prepared for early spud. The new well finished this week was 22 Los Alamos which was finished in the Los Flores zone of Miocene age which was found originally by Standard Oil Co. on the Los Flores property and which was subsequently found productive by Union Oil Co. on the Bell property. Although Standard proved up the existence of large production in the Miocene and Pacific Western Oil Co. has successfully completed two good wells, Union Oil Co. got the most appreciation from the discovery because of its extensive holdings involving the Bell and other properties in the area. In the Zaca Creek district southeast of Gato Ridge, General Petroleum Corp. is still working with 2 Wickenden which contains a heavy tarry mass that must be circulated out of the hole.

COASTAL DISTRICT COMPLETIONS

Cat Canyon, Santa Barbara County: Pacific Western 22 Los Alamos, 36-9n-33w, flowed 1,845 bbl., 18.8-gravity oil, 2 per cent cut, 38/64-in. bean, T.D. 5,550 ft., perf. 4,930-5,550 ft., Los Flores zone of Miocene age.

Canadian Fields

(Continued from Page 104)

the Dominion Bureau of Statistics at Ottawa show that production from the Fort Norman field in April totaled 19,692 bbl., compared with 2 bbl. in the same month last year. For the 4 months of 1943 the field produced 57,729 bbl. against 131 bbl. in the same period of 1942. The far-northern field now exceeds the combined output of Ontario and New Brunswick and in western Canada ranks second only to Turner Valley.

(Continued on Page 127)

Equipment Progress

Cardox Holds Fire Fighting Demonstration

Recently a fire-extinguishing demonstration was held at the Monee, Ill., plant of Cardox Corp. More than 80 fire-protection authorities were present. The demonstration was performed to show various applications of low-temperature, low-pressure liquid carbon dioxide in extinguishing fires. The accompanying pictures were taken during one phase of the demonstration. In the top view, the fire has been allowed to burn for 1 minute and 45 seconds, and the picture was taken just before extinguishment was begun. Complete extinguishment was achieved in 15 seconds, as seen in the lower view. Cooling characteristics of Cardox CO_2 discharge prevent reignition.

In the top view, the fire is allowed to burn for 1 minute and 45 seconds. It is seen here just before extinguishment is begun. Complete extinguishment of the fire is achieved in 15 seconds, as seen in the lower view. Cooling characteristics of Cardox CO_2 discharge prevent reignition

Trade Literature

Ingersoll-Rand Co., 11 Broadway, New York, N. Y.—A new booklet on surface condensers done in two colors throughout and bound in an attractive four-color cover. The bulletin contains 36 pages and more than 70 illustrations, including numerous cross-sectional views. Among the subjects discussed are structural design features, steam penetration, air-removal equipment, marine condensers, cross-flow condensers, essentials of a condenser plant, condenser accessories and pumping equipment.

B. F. Goodrich Co., Akron, Ohio.—Revised edition of catalog section on "Properties of Ameripol D," oil and heat-resisting synthetic rubber used in specialized industrial applications. The section discusses the properties of the product, and lists in table form the properties of the various compounds of Ameripol D.

Oakite Products, Inc., 44c Thames St., New York, N. Y. — A five-page special service report on care and maintenance of respirators, goggles, face shields, helmets, etc. After pointing out the necessity for providing adequate facilities for maintaining personal-safety equipment, the report discusses the equipment and materials required for effectively carrying out such a program. The subject of germicidal treatment of respirators, goggles, etc., by several different methods is discussed.

Register Extension for Pittsburgh Rotocycle Meters

Pittsburgh Equitable Meter Co., Pittsburgh, Pa., manufacturers of Rotocycle bulk-plant, tank-truck and pipe-line meters, has announced the availability of an extension drive for registers used on any of their meters. The purpose of this extension is to permit installing the meter proper beneath the platform of loading racks, in pits or underground so that all that intrudes into the working area is the relatively compact register. This makes an attractive and clean installation.

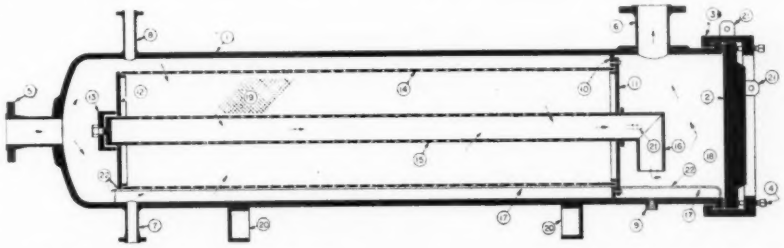
Rotocycle Meter, Model B-5, fitted with Master Meter Duplicator and extension drive

The register extension is made of heavy pipe fitted with internal bearings for support of the register drive shaft. To it may be applied any of this company's complete line of registers including straight reading, straight reading reset, vertical dial and Master Meter Duplicator.

The register extension can be furnished in any length up to a maximum of 5 ft.

IMPROVED DESIGN OF PIPE-LINE FILTERS

Alco pipe-line filters, manufactured by Alco Products division of American Locomotive Co., 30 Church Street, New York, N. Y., offer, according to the manufacturer, increased filtering capacity, decreased time out for recharge of filter, and ease of dismantling and assembling. As shown in the accompanying cross-sectional view, the shell space at the incoming end and around the perforated basket screen provides ample space for the heavier solids to deposit out at the bottom of the shell, before contacting with the filtering media in the basket. By directing the flow through the filter from the outside of the basket to the efflux pipe in the center, initial contact with the filtering media is made



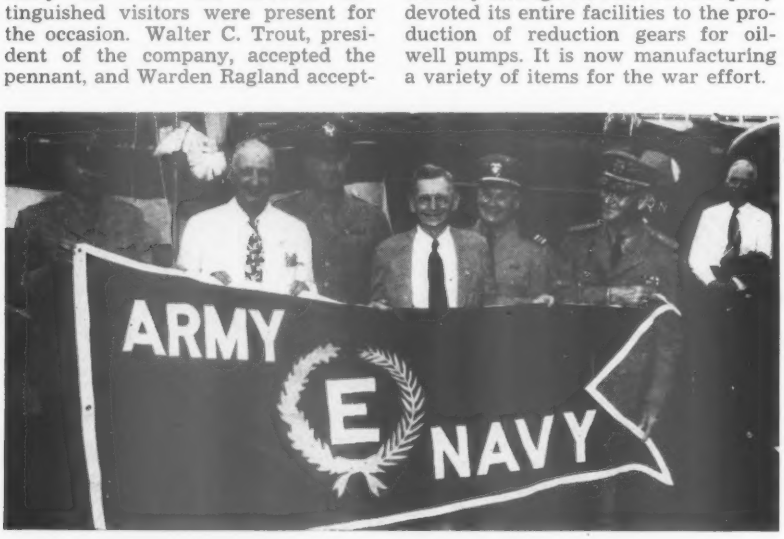
1. Welded steel shell
2. Cover
3. Alco clamp ring
4. Compression bolting
5. Inlet nozzle
6. Outlet nozzle
7. Drain nozzle
8. Vent nozzle
9. Drain coupling
10. Basket retaining flange
11. Basket front end plate
12. Basket rear end plate
13. Yoke and tap bolt
14. Perforated basket screen
15. Perforated efflux pipe
16. Efflux pipe outlet elbow
17. Guide strips
18. Outlet channel
19. Filtering material
20. Support saddles
21. Lifting lugs
22. Nonferrous facings

where its area is the maximum. This design permits the filters to be kept on stream at full rated discharge for longer periods of time than could be expected from conventional-type filters.

LUFKIN FOUNDRY & MACHINE CO. GETS AWARD

The Army-Navy "E" was awarded to the men and women of Lufkin Foundry & Machine Co., Lufkin, Tex., for excellence in the production of war equipment in an impressive ceremony on June 24. Several distinguished visitors were present for the occasion. Walter C. Trout, president of the company, accepted the pennant, and Warden Ragland accepted the "E" pins for the employes.

Lufkin Foundry & Machine Co. was organized in 1900. In 1919 the company increased its facilities and entered the production of pipe-line and refinery fittings. In 1923 the company devoted its entire facilities to the production of reduction gears for oil-well pumps. It is now manufacturing a variety of items for the war effort.



Col. Merle H. Davis, district chief, St. Louis ordnance district; W. C. Trout, president, Lufkin Foundry & Machine Co.; Capt. C. G. McDonald; Warden Ragland, employe representative; Comdr. James M. Clark; Rear Adm. Percy F. Foot (retired). In background is Russell E. Gardner, Jr., of St. Louis ordnance district

Among Equipment Men

Byron Jackson Announces Personnel Changes

O. W. MORGAN

The Oil Tool Division of Byron Jackson Co., Los Angeles, Calif., announced the appointment of O. W. Morgan, Jr., as sales manager. "Ox" Morgan, as he is known to his many friends in the petroleum industry, has a background of several years in various offices of the company. He will make his headquarters at Los Angeles.

Garth F. Nicholson has been promoted to the combined position of works manager and chief engineer of the Oil Tool Division following many years of engineering and research work.

Terminating 11 years of service with Byron Jackson Co., Frank Champion has resigned as vice president and general manager of the Oil Tool Division, but will serve as a director of the company. Mr. Champion now is associated with Glenn H. McCarthy as general manager of drilling and production operations and will maintain his office and residence at Houston, Tex.

Chandler Elected Dresser Board Member

H. N. Mallon, president of Dresser Manufacturing Co., Bradford, Pa., has announced the election of Norman Chandler, of Los Angeles, Calif., as a member of the company's board of directors, and of R. E. Reimer, of Bradford, as secretary and treasurer.

Mr. Chandler is president and general manager of the Los Angeles Times and secretary of the American Newspaper Publishers Association. He is also a director of Pacific Pump Works, of Huntington Park, Calif., one of Dresser's subsidiaries.

Mr. Reimer has been with the company since January 1929 and has been treasurer since May 1932. His election to the additional office of secretary fills a vacancy caused by the death of Merrill N. Davis.

Edward Appoints New Chief Engineer

David MacGregor has been appointed chief engineer of Edward Valve & Mfg. Co., Inc., East Chicago, Ind., with which company he has been associated in various engineering capacities since 1925. Mr. MacGregor was educated in Scotland and took additional engineering work at the Illinois Institute of Technology and Purdue University.

Luli Promoted by Cooper-Bessemer

Willard A. Luli, engineer with the Cooper-Bessemer Corp. for the past 8 years, has been promoted to the post of factory production representative for the company's two plants at Mount Vernon, Ohio, and Grove City, Pa.

In his new assignment, Mr. Luli is affiliated with the company's Washington, D. C., office, where he serves as Cooper-Bessemer representative on the War Production Board for the Large Diesel Engine Manufacturers' Planning and Scheduling Committee.

His principal duties involve the allocation of materials needed by Cooper-Bessemer in their all-out war production.

J. B. Reilly on Rotary Board

J. B. Reilly, president of Fluid Packed Pump Co., Los Nietos, Calif., was recently elected a board member of Rotary International at the club's annual convention held in St. Louis, Mo. Mr. Reilly, a pioneer oil man, was reared in the California fields and has been in the oil-tool business all his life. He has held many responsible local and district positions in Rotary and his elevation to International board member climaxes many years of untiring effort in furthering the club's interests.

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE: 2—110 HP Miller Compressors, horizontal type, gas prime mover, 80# intake, 365# discharge, 180 RPM. BANKOFF SUPPLY CO., Box 2301, Tulsa, (1), Okla.

FOR SALE: Four 10 x 4½ x 10 Duplex Steam Pumps, make Worthington and Gardner-Denver. Good condition. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE: One 7" RB Union Tool Draw Works unitized; one Johnson Jack Shaft type Draw Works unitized. Both in A-1 condition. Inquire T. T. Eason and Company, Enid, Okla.

HOUSTON MACHINE SHOP FOR SALE
$20,000.00
Very profitable jobbing business; wonderful post-war possibilities. For sale account owner's health. Address—P.O. Box 1122, Houston, Texas.

3 ROTARY PUMPS
2—90 GPM Viking 3 HP, 3 Ph. 60 Cy. 220 V. Single Pumps.
100 GPM Blackmer 3 HP, 3 Ph. 60 Cy. 220 V. Double Pump.
PUMPS BOUGHT AND SOLD
L. M. STANHOPE
Wayne, Penna.

EQUIPMENT FOR SALE

TWO Vogt Horizontal water tube boilers, 125# steam pressure allowed. Equipped with Laclede chain grate stokers. 356 West North Street, Indianapolis, Indiana.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD. Fox Theater Bldg., Detroit, Mich.

WANTED

COMPLETE Plants, Pipe-Lines, and Industrial Enterprises bought for cash or liquidated for the owners. Wire, phone, or write—INDUSTRIAL SUPPLY & EQUIPMENT CO., INC., 1044 Canal Bldg., New Orleans, La.—MA 5586.

LEGAL BLANK

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

RANCHES AND FARM LANDS

240,000 ACRES northwestern New Mexico. Mineral rights largely intact. Excellent ranch land; timber; ores; near coal and oil. $3.00 acre; terms. Box 352, Boulder, Colo.

Crude-Oil Prices

(Continued from Page 114)

Gulf Refining Co.:
Illinois basin, 5-21-41 ..... $1.37

Michigan

Simrall Corp., 5-27-41:
Greendale, Porter, Vernon, Crystal, and Wise $1.44
Buckeye, Bentley, Edenville, Beaverton, and Monitor (sweet) 1.42
Freeman, Redding, Lincoln and Winterfield 1.39
Hamilton-Grout 1.29
West Branch-Arenac 1.24
Sohio Corp., 5-1-41:
Bloomingdale-Columbia $1.45
Mid-West Refineries, Inc., 5-1-41:
Kent County $1.38
Pure Oil Co., 5-27-41:
Sherman $1.39
Midland (Midland County) 1.44

ROCKY MOUNTAIN GRAVITY TABLE

Below 29	$0.96
29-29.9	.98
30-30.9	1.00
31-31.9	1.02
32-32.9	1.04
33-33.9	1.06
34-34.9	1.08
35-35.9	1.10
36-36.9	1.12
37-37.9	1.14
38-38.9	1.16
39-39.9	1.18
40 and above	1.20

Stanolind Oil & Gas Co., 5-20-41, includes Dutton Creek, Midway, and Salt Creek except Tensleep crude, Wyoming.
Sinclair-Wyoming Oil Co., 5-20-41, includes Salt Creek and Lost Soldier, except Tensleep crude, Wyoming.
Continental Oil Co., 5-21-41, includes Fort Collins and Wellington, Colorado.

Wyoming

Ohio Oil Co.:
Rock River (5-20-41) $1.10
Lance Creek (7-1-41) 1.12
Elk Basin and Grass Creek (light) 1.00
Elk Basin (heavy) (4-28-43) ..... .90
Grass Creek (heavy) (4-1-43) ..... .65
Stanolind Oil & Gas Co.:
Frannie (light) (4-1-43) $0.85
Frannie (heavy) (4-1-43) ..... .62
Grass Creek (light) (5-20-41) 1.00
Grass Creek (heavy) (4-1-43) ..... .85
Elk basin (5-20-41) 1.00
Salt Creek (Tensleep) (4-28-43) ..... .90
Continental Oil Co.:
Big Muddy (5-30-41) $1.08
Lance Creek (9-1-41) 1.12

Montana

Continental Oil Co., 4-1-41:
Cat Creek $1.15

Colorado

Stanolind Oil & Gas Co., 5-20-41:
Iles $1.07
Continental Oil Co., 5-21-41:
Canon City-Florence $1.05

Canadian Fields

(Continued from Page 122)

Crude and natural-gasoline production from all Alberta fields in May totaled 843,431 bbl., or 27,207 bbl. daily, an increase of 421 bbl. in the daily average from April but a decrease of 1,075 bbl. from the daily average from May 1942. Of the May production, 194,174 bbl. came from Turner Valley, including: Shallow crude, 404 bbl.; limestone oil wells, 789,432 bbl.; limestone gas wells, 4,338 bbl. Natural-gasoline recoveries added 38,045 bbl. to the Turner Valley total, the four adsorption plants processing 76,568,000 cu. ft. of gas daily.

Production from outside fields in May included: Red Coulee, 690 bbl.; Vermilion, 2,481 bbl.; Wainwright, 1,728 bbl.; Del Bonita, 124 bbl.; Taber, 6,189 bbl. Outside fields showed an increase of 1,000 bbl. over April, or nearly 10 per cent, of which 408 bbl. was a result of increased production from the Vermilion field.

LEGAL

OIL AND GAS LEASE

U. S. DEPARTMENT OF AGRICULTURE, FARM SECURITY ADMINISTRATION, DALLAS, TEXAS. Sealed bids, in triplicate, will be received until Two O'clock (p.m.) (CWT), Wednesday, July 21, 1943, and then publicly opened, offering bonus for operating rights in connection with gas and oil lease on an undivided three-eighths interest in the mineral rights on the following block of land, located in Garvin County, Oklahoma, and described as follows: S½ W¼, S½N½SW¼, NW¼NW¼SW¼, Sec. 25, and NW¼NE¼NW¼, Sec. 36, all in T. 4 N., R. 1 W., containing one hundred forty (140) acres. Award of lease will be made to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the office of the Regional Business Manager, Farm Security Administration, Parry Avenue at Commerce, Dallas, Texas.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, District Land Office, Las Cruces, New Mexico. Notice is hereby given that the S½ NW¼ sec. 9, T. 22 S., R. 37 E., N.M.P.M., New Mexico, 80 acres of land in the Penrose-Hardy oil and gas field, is offered as one parcel to the responsible qualified bidder of the highest bonus per acre for lease under section 17 of the act of February 25, 1920 (41 Stat. 437), as amended, at the royalty rate scale in the lease form in General Land Office Circular 1386, at a sale to be held in the district land office at Las Cruces, New Mexico, at 10 o'clock a.m. on July 28, 1943. The successful bidder must deposit on the date of the sale a certified check on a solvent bank, or cash, for one-fifth of the amount of his bid, and file a showing of qualifications to receive the lease as required by section 7 of Circular 1386. The remaining four-fifths, together with the annual rental in advance at the rate of $1 per acre, must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. The bidders are warned against violation of the provisions of section 59 of the United States Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids at the discretion of the Secretary of the Interior. Register.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, District Land Office, Billings, Montana. Notice is hereby given that the lands herein described within the known geologic structure of the Elk Basin field, Montana and Wyoming, are offered to qualified bidders of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226), at a sale to be held in the district land office at Billings, Montana, at 10 o'clock a.m. August 12, 1943, in the following parcels: Montana, M.M., Parcel No. 1, T. 9 S., R. 23 E., sec. 34, lot 8, sec. 36, lot 5. Wyoming, 6th P.M., Parcel No. 2, T. 58 N., R. 99 W., sec. 19, N½NW¼NW¼SE¼, E½ NW¼SE¼, E½SW¼SE¼; Parcel No. 3, T. 58 N., R. 99 W., sec. 30, E½NE¼NW¼NE¼, NE¼SE¼NW¼NE¼, NW¼NE¼NE¼, W½ SW¼NE¼NE¼, NE¼SW¼NE¼NE¼, E½ E½NE¼, SE¼NW¼SE¼NE¼, SW¼SE¼ NE¼, NW¼NE¼SE¼, E½E½SE¼, SW¼ SE¼SE¼; Parcel No. 4, T. 58 N., R. 100 W., sec. 23, lot 1, SE¼NE¼; Parcel No. 5, T. 58 N., R. 100 W., sec. 25, NE¼NW¼, W½ SW¼NE¼SE¼, W½SE¼SE¼, S½NE¼SE¼ SE¼, SE¼SE¼SE¼. Each successful bidder must deposit on the date of sale with the officer in charge of the sale a certified check on a solvent bank or cash for one-fifth of the amount bid by him and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. Bids may be submitted combining two or more parcels for the lands in Wyoming provided the aggregate acreage does not exceed 640 acres, the drilling, producing, rental and royalty requirements to apply separately to each parcel. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Register.

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Journalisms:

LIFTING costs per barrel of oil produced provide a yardstick by means of which the economic efficiency of a well can be determined. When they become high efforts must be made to reduce them; when they become too high, regardless of efforts made to lower them, the well must be abandoned. There is, however, a tendency to use this simple cost relation as a yardstick to measure the efficiency of pumping operations on a lease or in a field. This is often an unfair method as the low cost of pumping a well is often due to the quantity of oil which it can produce. Actually, a lease having a low cost per barrel may have too high a pumping cost. How pumping costs should be calculated is the subject of a staff article scheduled for next week's Engineering and Operating Section.

TO most people whose sole contact with hydrofluoric acid has been in a college laboratory, discussion of the rapid increase in the use of this chemical in refinery processes calls to mind wax bottles packed in sawdust which had to be handled with extreme care. Actually the material used in the refinery is anhydrous HF whose properties are very different from those of the aqueous solution commonly encountered. The properties of anhydrous HF are such that transportation and handling of large volumes present many hazards, of which most are due to ignorance of these properties. In an article to appear in next week's Journal, Charles M. Fehr, chief chemical process engineer of Pennsylvania Salt Manufacturing Co. will tell how to handle anhydrous hydrofluoric acid with safety.

MR. FEHR is particularly well qualified to deal with this subject, having been identified with research on and manufacturing of anhydrous HF for over 20 years. For the past few years, he has been in close association with petroleum chemists and is thoroughly conversant with the part that HF plays in the oil business.

THE Semiannual Review, out July 29, will be of particular interest this year because of the difficulties imposed by wartime demands and transportation. How these demands are being met, whether discoveries are meeting expectations and the outlook for the national oil future are all covered by articles which will appear in this issue.

REDUCTION of costs, improvement in quality and yield of wax were obtained in an eastern refinery when a sweater was installed of a type substantially different from those in common use. The operation of this sweater, its construction and a comparison of the results obtained with those of older methods will be described in a staff article in next week's issue.

CALENDAR

July

PAW DISTRICT 3 PRODUCTION COMMITTEE, regular monthly meeting, Lansing, Mich., July 16.

KENTUCKY OIL AND GAS ASSOCIATION, annual midyear meeting, Ashland, Ky., July 24.

September

AMERICAN CHEMICAL SOCIETY, petroleum division, fall meeting, September 6-10. Place not yet determined.

October

AMERICAN GAS ASSOCIATION, twenty-fifth annual meeting, Jefferson Hotel, St. Louis, Mo., October 11-13.

MID-CONTINENT OIL AND GAS ASSOCIATION, annual meeting, Blackstone Hotel, Fort Worth, Tex., October 14-15.

November

AMERICAN PETROLEUM INSTITUTE, twenty-fourth annual meeting, Palmer House, Chicago, Ill., November 8-11.